THE REPORT

OF THE

PRESIDENT

OF

QUEEN'S COLLEGE, BELFAST,

FOR

THE YEAR ENDING 1st MARCH, 1861.

WITH APPENDICES.

Presented to both Houses of Parliament by Command of Her Majesty.

DUBLIN:
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FOR HER MAJESTY'S STATIONERY OFFICE.
1861.

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THE REPORT

OF THE

PRESIDENT OF QUEEN'S COLLEGE, BELFAST,

FOR

THE YEAR ENDING MARCH 1, 1861.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

MAY IT PLEASE YOUR MAJESTY,

I have the honour and great satisfaction of presenting to your Majesty this Annual Report of the condition and progress of this College. My Report of last year recorded an increase of 32 Students beyond the attendance in the previous year, now I have the gratification of subjoining an authenticated table showing a further advance of attendance in the present Session above the last, of 57 Students; the whole number present prosecuting their various courses of study being 312. A comparison of this attendance with that of 1852–53, shows that from that time to the present, the numbers upon the attendance rolls are more than doubled. The annexed table brings out this important fact that the steady increase is principally amongst the Matriculated Students. In the Session 1852–53 there were present 101 Matriculated, and 53 Non-Matriculated young men. In 1859–60 the Matriculated had risen to 199, and the Non-Matriculated only to 58. At present the increase on the former side is still more remarkable, there being present 239 Matriculated, and 73 Non-Matriculated.

RETURN of the Total Number of Students attending Queen's College, Belfast, since the year 1852.

Session.	Matriculated.	Non-Matriculated.	Total.
1852–53,	101	53	154
1853–54,	114	54	168
1854–55,	118	65	183
1855–56,	119	74	193
1856–57,	136	58	194
1857–58,	153	54	207
1858–59,	160	63	223
1859–60,	199	58	257
1860–61, in so far,	239	73	312

NUMBER of new Students, or Freshmen, Matriculated and Non-Matriculated, attending Queen's College, Belfast, for the first time in the Session 1860–61.

Matriculated,	99
Non-Matriculated,	38
Total,	137

Thus the Matriculated Students, amongst those who entered for the first time this winter, have risen rapidly, as compared with the others. The following return of the medical men in attendance for each Session, whilst it proves a rapid advancement in this highly important department, shows also that the progression is on the side of the Matriculated. In the Session in which the College opened there were in attendance 28 Matriculated, and 27 Non-Matriculated Medical Students, total 55. In the Session 1859–60 they had risen respectively to 56 and 39, total 95; and in the present to 70 and 46, total 116.

Return of the Number of Medical Students in attendance in each Session.

Session.	Matriculated.	Non-Matriculated.	Total.
1849–50,	28	27	55
1850–51,	20	35	55
1851–52,	25	39	64
1852–53,	29	33	82
1853–54,	29	37	68
1854–55,	39	36	75
1855–58,	33	48	81
1856–57,	38	25	61
1857–58,	35	32	67
1858–59,	45	34	79
1859–80,	56	39	95
1860–61,	70	46	116

The relative proportions of the different denominations remain nearly the same as in former years, and it is a matter of congratulation that the spirit of good will, of harmonious action, and generous rivalry, amongst the Students of the different churches, not only remains undiminished, but affords another proof of the advantage and practicability of united education.

DENOMINATIONAL RETURN.

	SESSIONS.	
	1859-60.	1860-61.
Established Church,	43	57
General Assembly,	180	189
Non-Subscribing Presbyterians,	15	14
Roman Catholics,	16	22
Wesleyan Methodists,	8	7
Covenanters,	8	9
Seceders,	1	4
Independents,	2	–
Baptists,	–	–
Various,	4	9
Religious Denomination withheld,	–	1
Total,	257	312

The competition for Scholarships, both junior and senior are always of a very testing character, regarding the positive and comparative merits of the aspirants to these collegiate honors. Nothing has tended so materially to raise the standard of education in the province, as the annual contests for these exhibitions, according to the courses for the different departments, as laid down by the

Council. To carry success, every Student, from the breaking up of the College in the middle of June until its reopening in October, must with untiring zeal and energy devote himself closely to acquire the necessary knowledge. The struggle to secure or to retain collegiate rank is often so close as to place the Examiners and Council in great difficulty, when deciding on the comparative merits of those who compete. On a former occasion I took leave to remark on the peculiar organization that has hitherto existed in the Queen's Colleges, regarding this class of exhibitions. Whereas in other Universities a Scholarship is held for three, four, or five years, in the Queen's Colleges it has hitherto been tenable only for one year, and must be contended for anew by those who enter the lists at the end of that period. By an oversight of this, it might be made to appear that the Scholarships are nearly treble what they really are, and thus be made by so much to exaggerate the real number of those placed at the disposal of the College. Merit alone is the test for obtaining these Scholarships.

SCHOLARSHIPS awarded in the several Faculties, 1860–61.

7 Senior Scholarships in Arts.
1 do Medicine.
28 Junior Scholarships in Arts.
2 Engineering Scholarships.
2 Agricultural Scholarships.
5 Medical do.
3 Law do.

LAPSED.

1 Senior Scholarship in Medicine.
1 do Law.
1 Literary Scholarship, 3rd year, Arts.
1 Literary Scholarship, 2nd year, Arts.
2 Scholarships, 2nd year, Agriculture.
1 Medical Scholarship, 2nd year.

This College, viewed as a member of the Queen's University in Ireland, continues to hold its distinguished place, whether in regard to the number of Students it sends forward to graduate in the Queen's University, or in reference to the position they yearly attain in the intellectual struggles for honors and exhibitions with the co-ordinate Students of Cork and Galway.

The Students also of this College continue yearly to gain, in the Competitive Examinations of the Civil Service, high distinctions and numerous most valuable places, thus establishing the excellence and soundness of the courses of education afforded within these walls, and their adaptation to the circumstances of the age and of the country.

Our records show a 1st place at the Woolwich Examination, and also a 1st place on two occasions at the difficult Examination for the Three Years Scholarship in the Inns of Court, London; one of them being in a former year, and the other during last Summer. At the East India Examination also the success of the Belfast Students has been very remarkable; in this last service, adding the five places given in last July, Students of this College have already carried the 1st and 2nd places, two 4th places, a 10th, a 15th, a 17th, a 35th, a 40th, and a 72nd place.

At the last Examination a Student of this College headed the list of all Irish competitors, whilst another stood first in Mathematics of the whole of the candidates, and another also first of them all in the Natural Sciences.

In the Army and Navy Medical Services, many of the Students who have issued from these walls have obtained the highest places, some being marked by the Examiners as pre-eminently distinguished, whilst a number in the various faculties are continuing to distinguish themselves highly in the professions which they have selected. I think it right to state that, notwithstanding the success thus indicated, few of the Students of Belfast College appear to be preparing for the next East India Examination, owing, no doubt, to the increasing demand for well educated young men in various departments and professions.

Since the opening of the College, I have yearly pleaded with your Majesty's Government for a grant to build Anatomical and Dissecting rooms on the grounds of the College itself.

I fully understand the difficulties which have hitherto impeded the immediate accomplishment of this my strong desire, and that of the whole Medical Faculty, and now that the Executive Government in Ireland, after the most mature deliberation, are about to take measures to supply the want, by appealing to Parliament to include a sum for this purpose in the forthcoming estimates, I feel bound to say that I have never known any case in which relief to the Medical Students was more necessary. Owing to the distance of the present anatomical rooms from the College, it is extremely inconvenient to the Students during the most inclement weather to proceed from lectures in the College to dissections in the dissecting room. It becomes almost impossible for the Professor of Anatomy and Physiology, who is engaged the greater part of his time in the College, to afford due attention to the superintendence of the dissecting class, whilst the objects of illustration that ought to remain connected in one building are often necessarily separated.

Owing to the very promising condition of the Medical School, and the unspeakable importance of a department with which the highest interests of the community are connected, it is greatly to be desired that when the grant is made, no time should be lost in erecting and completing the contemplated buildings.

In common with all who desire the extension of education in this country, I have heard with much gratification of the intention of your Majesty's Government to deal, as soon as in their power, with the question of intermediate education in Ireland. The arguments in favour of supplying this want by establishing intermediate schools in suitable localities, so as to develop the intellectual and industrial resources of the country have frequently been pressed upon the Government by numerous influential bodies. I would only take leave to repeat the expression of my conviction that the want of preparatory schools established throughout Ireland, on some just principle, is prejudicial, not only to collegiate and university education, but to the public service itself, which has placed competition on so wide a basis, and offers high rewards to successful candidates.

I am happy to Report that the progress of the Queen's University, during the last year, has been very encouraging,—85 degrees of different kinde having been conferred by the Vice-Chancellor, after the usual Examinations, in October last, in St. Patrick's Hall, Dublin Castle, in presence of His Excellency the Lord Lieutenant, being an increase of 26 degrees over the number conferred in 1859.

There is reason to hope that the Preliminary Examination now adopted, the details of which will be found in the annexed University Ordinance, will, with the growing desire amongst the Students themselves for graduation, on account of the high value attached to the degrees of the Queen's University in Ireland, further the great objects so anxiously desired by the Senate.

Various Returns of the number of Students in each class, of the amount of Fees paid to each Professor, and of the number of Lectures delivered from each Chair, together with the accounts of Expenditure, the enlarged digest of subjects, and the papers used at the various Examinations, will be found given in full length in the Appendix.

All of which, on behalf of this College, is testified by your Majesty's most dutiful servant,

P. SHULDHAM HENRY,
President.

QUEEN'S COLLEGE, BELFAST,
March 28, 1861.

ORDINANCE

Of the QUEEN'S UNIVERSITY in IRELAND, prescribing COURSES in the FACULTY of ARTS, and AMENDING FORMER ORDINANCES.

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1. COURSE FOR THE DEGREE OF BACHELOR IN ARTS.

Candidates for the Degree of Bachelor in Arts are hereby required—

1. To have been admitted Matriculated Students of one of the Colleges of the Queen's University in the Faculty of Arts.
2. To have subsequently studied in one of the Colleges of the Queen's University the Course herein prescribed.
3. To have passed the University Examinations herein prescribed.

The Course for the Degree of Bachelor in Arts shall extend over three Sessions, and shall comprise attendance on the following curriculum:—

FIRST SESSION.

English (One Term).
Greek.
Latin.
Modern Continental Languages.
Mathematics.

SECOND SESSION.

Logic (One Term).
Natural Philosophy.

Along with any two of the following:—

Greek (Second Course).
Latin (Second Course).
Modern Continental Languages (Second Course).
Mathematics (Second Course).

THIRD SESSION.

English Language and Literature.
Metaphysics, or History, or Political Economy. (Two Terms).
Chemistry.
Zoology, or Botany.

Attendance on these Courses shall, in all cases, be understood to include passing such examinations as may be appointed by the College Council, and the catechetical parts of the Courses of Lectures.

Candidates for the Degree of Bachelor in Arts shall reside at their respective Colleges during at least the first two terms of each Session, but may be exempted from residence during the third term by a special grace of the College Council.

Third year's Students may substitute attendance on one or on two Courses of Honor Lectures, for a like number of the Courses above set down for study in the third Session.

Candidates for the Degree of Bachelor in Arts shall pass two University Examinations—a Preliminary and a Degree Examination.

The Course for the Preliminary Examination, shall include Greek, Latin, a Modern Continental Language, and Mathematical Science. Students who have completed their second Session must pass this Examination before rising to the third year, unless prevented by illness or other inevitable accident, in which case the Senate may admit them to a Supplementary Examination.

Candidates who have completed the Undergraduate Course, may offer themselves at the Degree Examination for graduation either with Honors or without Honors.

If they seek to graduate with Honors, they may select for their Examination any one of the following groups:—

Greek and Latin.
Modern Continental Languages.
Mathematical Science.
Experimental Science.
Natural Science.

Or any two of the following:—

English Language and Literature.
Logic and Metaphysics.
Logic and History.
Logic and Political Economy.

Candidates who seek the Degree without Honors, may select for their Examination any group of subjects from the following list, provided the sum of the numbers attached in this list to the selected subjects be at least four:—

English Language and Literature,	2	Latin,	1
Mathematical Science,	2	Each Modern Continental Language,	1
Experimental Physics,	2		
Chemistry,	2	Logic,	1
Zoology,	1	Metaphysics,	1
Botany,	1	History,	1
Greek,	1	Political Economy,	1

English Composition will form a part of all University Examinations.

This Ordinance is binding on all Candidates for the Degree of Bachelor in Arts who have not completed the first year's Course. Students now in their second[*] or third Session shall proceed under the Ordinances hitherto in force.

2. COURSE FOR THE DEGREE OF MASTER IN ARTS.

Bachelors in Arts of one year's standing, may offer themselves for Examination for the Degree of Master in Arts, and may select for their Examination any one of the following groups:—

Greek and Latin.
Modern Continental Languages.
Mathematical Science.
Experimental Science.
Natural Science.

Or any two of the following:—

English Language and Literature.
Logic and Metaphysics.
Logic and History.
Logic and Political Economy.

This Ordinance supersedes former Ordinances prescribing the curriculum for the Degree of Master in Arts.

3. COURSE FOR THE DIPLOMA OF LICENTIATE IN ARTS.

A Diploma conferring the title of Licentiate in Arts of the Queen's University in Ireland, shall be granted to Candidates who comply with the following regulations:—

Candidates for this Diploma are hereby required—

1. To have Matriculated in one of the Colleges of the Queen's University.
2. To have pursued in one of the Colleges of the Queen's University the Course herein prescribed.
3. To have passed the University Examination herein prescribed.

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[*] Second year's Students may offer themselves for the University Examinations in conformity with the present Ordinance.

The Course for the Diploma of Licentiate in Arts shall extend over two Sessions, and shall comprise attendance on the following curriculum:—

FIRST SESSION.

Two Languages, of which one may be English.
Mathematics.
Another Course on any subject in the annexed list.

SECOND SESSION.

Greek, Latin, or a Modern Continental Language.
Logic (One Term).
Natural Philosophy.
And two other Courses on subjects in the annexed list.

If any of the Courses, except that on Logic, extend over one term only, some other Course from the annexed list must be attended as a supplement to it, but not necessarily in the same Session.

Credit will not be given for attending the same Course of Lectures a second time.

Attendance on the Courses shall, in all cases, be understood to include passing such Examinations as the College Council shall appoint, and the catechetical parts of the Courses of Lectures.

Candidates for the Diploma of Licentiate in Arts shall reside at their respective Colleges during at least the first two terms of each Session.

After having completed the above curriculum, Candidates for the Diploma shall pass a University Examination in Greek, Latin, or a Modern Continental Language; in Mathematical Science; and in two other subjects selected from the annexed list, viz.:—

The Mathematical Sciences.
The Experimental Sciences.
The Natural Sciences.
Geometrical Drawing.
Mensuration, Levelling, and Mapping.
Anatomy and Physiology.
English Language and Literature.
The Modern Continental Languages.
Greek.
Latin.
Logic.
Metaphysics.
History.
Political Economy.

English Composition will form a part of all University Examinations.

Licentiates in Arts who may desire to proceed to the Degree of Bachelor in Arts, may enter directly on the second Session in the Course for this Degree, provided they attend in it, instead of the usual curriculum, all the Courses prescribed for the first two years which they shall not have already attended in the curriculum for the Diploma of Licentiate.

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4. EXAMINATION OF CANDIDATES WHO ARE NOT MEMBERS OF THE UNIVERSITY.

Two Examinations shall be held every year, commencing at the same time, for Candidates who are not members of the University.

Examination for First Class Certificates.

All Candidates for the certificate of having passed the more advanced Examination, are hereby required to satisfy the Examiners in reading English aloud, writing from Dictation, English Grammar, English Composition, Elementary Arithmetic, and Elementary Geography.

Each Candidate must satisfy the Examiners also in at least two of the following sections; a fair knowledge of one of the subjects in each section will enable a Candidate to pass in that section :—

First Section—English.

Any one of the following :—

1. A selection from English History, to be prescribed each year.
2. A selection of English Authors, to be prescribed each year.
3. The Outlines of Political Economy.
4. Geography.

Second Section—Languages.

Any one of the following :—

1. Greek. 2. Latin. 3. French. 4. German.

Third Section—Mathematical Science.

1. Mathematics, or
2. Mathematics and Mathematical Physics.

Fourth Section—Experimental and Natural Sciences.

Any one of the following :—

1. Experimental Physics.
2. Chemistry.
3. Zoology and Botany.
4. Geology and Mineralogy.

Examination for Second Class Certificates.

All Candidates for the certificate of having passed the second Examination, are hereby required to satisfy the Examiners in reading English aloud, writing from Dictation, English Grammar, English Composition, Elementary Arithmetic, and Elementary Geography.

Each Candidate is required to satisfy the Examiners also in one of the following :—

1. Greek. 2. Latin. 3. French. 4. Mathematics.

Candidates may also offer themselves for Examination in German, Mechanics, Chemistry, Zoology, or Botany.

The Degree Examinations shall be conducted in the Hall of the University; the other Examinations in such places as the Senate shall from time to time appoint.

APPENDIX.

APPENDIX, No. 1.

Appendix, No. 1.

QUEEN'S COLLEGE, BELFAST, and QUEEN'S UNIVERSITY.

Queen's College, Belfast, and Queen's University.

THE QUEEN'S COLLEGE, BELFAST, is a Corporation under the name and style of "THE PRESIDENT, VICE-PRESIDENT, AND PROFESSORS OF QUEEN'S COLLEGE, BELFAST." It was founded under the provisions of the Act 8 & 9 Victoria, cap. 66, intituled "An Act to enable Her Majesty to endow new Colleges for the Advancement of Learning in Ireland." Under the powers given by this Act, it was determined to found three Colleges. Belfast, Cork, and Galway, were selected as the sites of these Colleges, and on the 30th day of December, 1845, letters patent were issued, incorporating them. The Presidents and Vice-Presidents of the three Colleges were formed into a Board, called "The Board of Queen's Colleges," for the purpose of drawing up the Statutes and arranging the system of education to be pursued in them.

On the 4th of August, 1849, the Professors were appointed, and the Colleges opened for the reception of students on the 30th October, in the same year.

Letters Patent, constituting the Statutes, were issued on the 11th of December, 1849.

THE COUNCIL OF THE COLLEGE.

The President.
The Vice-President.
The Dean of the Literary Division of the Faculty of Arts.
The Dean of the Science Division of the Faculty of Arts.
The Dean of the Faculty of Medicine.
The Dean of the Faculty of Law.

PROFESSORS.

Literary Division of the Faculty of Arts.

The Greek Language, . .	Charles MacDouall, LL.D.
The Latin Language, . .	Rev. Charles Parsons Reichel, D.D.
History and English Literature,	George Lillie Craik, LL.D.
Modern Languages, . .	Mathias Joseph Frings, Ph.D.
The Celtic Languages, . .	John O'Donovan, LL.D., M.R.I.A.

Science Division of the Faculty of Arts.

Mathematics, . . .	George Middleton Slesser, B.A., F.C.P.S.
Natural Philosophy, . .	John Stevelly, LL.D.
Chemistry, ...	Thomas Andrews, M.D., F.R.S., M.R.I.A.
Natural History, . . .	[Vacant.]
Logic and Metaphysics, .	Rev. James M'Cosh, LL.D.
Mineralogy and Geology, .	Wyville Thomson, LL.D., F.R.S.E., F.G.S.
Civil Engineering, . .	James Thomson, C.E., A.M.
Agriculture, ...	John F. Hodges, M.D., F.C.S.

Faculty of Medicine.

Anatomy and Physiology, .	Peter Redfern, M.D. Lond. F.R.C.S.
Practice of Medicine, . .	John Creery Ferguson, A.M., M.B.
Practice of Surgery, . .	Alexander Gordon, M.D.
Materia Medica, . . .	James Seaton Reid, M.D.
Midwifery, ...	William Burden, M.D.

Faculty of Law.

English Law, . . .	Echlin Molyneux, A.M.
Jurisprudence and Political Economy, . . .	T. E. Cliffe Leslie, LL.D.

OFFICE BEARERS.

Curator of Museum, . .	The Professor of Mineralogy and Geology.
Registrar, ...	Rev. Richard Oulton, A.B.
Librarian, ...	Rev. George Hill.
Bursar, ...	Alexander Dickey, Esq.

Appendix, No. 1.

Queen's College, Belfast, and Queen's University.

DEANS OF RESIDENCES.

United Church of England and Ireland,	Rev. Henry Murphy, A.M.
General Assembly of the Presbyterian Church in Ireland,	Rev. Henry Cooke, D.D., LL.D.
Irish Association of Non-Subscribing Presbyterians,	Rev. John Porter.
Wesleyan Methodists,	Rev. Daniel Macafee.

The students of the College are either Matriculated or Non-matriculated. All the courses for Matriculated students in Arts, including the Departments of Civil Engineering and Agriculture, and also in the Faculties of Medicine and of Law, will be found in the Calendar which is published annually.

Non-matriculated students, on paying the regulated class fees, and signing an engagement to observe order and discipline in the College, are permitted, without undergoing a preliminary examination, to attend any separate course or courses of lectures; but are not permitted to become candidates for Scholarships or Prizes, or to enjoy other privileges of the Matriculated students.

Students in any of the Faculties can be admitted *ad eundem* from the other Queen's Colleges, or from any University capable of granting degrees.

COLLEGIATE SCHOLARSHIPS.

In the FACULTY OF ARTS—30 Junior Scholarships, of £24 each, are awarded to Undergraduates—15 for Proficiency in Literature, and 15 for Proficiency in Science; also, 7 Senior Scholarships, of £40 each, to Graduates; also, 2 Scholarships, of £20 each, to Engineering, and 4 of £15 each, to Agricultural Students.

In the FACULTY OF MEDICINE—6 Junior Scholarships, of £20 each, and 2 Senior Scholarships, of £40 each, are awarded.

In the FACULTY OF LAW—3 Junior Scholarships, of £20 each, and 1 Senior Scholarship, of £40, are awarded.

SCHOLARSHIPS AWARDED IN THE SEVERAL FACULTIES, 1859–60.

8 Senior Scholarships awarded.
26 Junior Scholarships in Arts awarded.
2 Engineering Scholarships.
3 Agricultural Scholarships.
6 Medical Scholarships.
2 Law Scholarships.

Lapsed—2 Senior Scholarships.
,, 1 Literary Scholarship of Third Year's Arts.
,, 2 Science Scholarships of Third Year's Arts.
,, 1 Science Scholarship of Second Year's Arts.
,, 1 Agricultural Scholarship of Second Year.
,, 1 Law Scholarship of Third Year.

1860–61.

8 Senior Scholarships awarded.
28 Junior Scholarships in Arts awarded.
2 Engineering Scholarships.
2 Agricultural Scholarships.
5 Medical Scholarships.
3 Law Scholarships.

Lapsed—1 Senior Scholarship in Medicine.
,, 1 Senior Law Scholarship.
,, 1 Literary Scholarship of Third Year.
,, 1 Literary Scholarship of Second Year.
,, 2 Agricultural Scholarships of Second Year.
,, 1 Medical Scholarship of Second Year.

By an order of Her Majesty in Council, of 21st May, 1855, applying to the Civil Service, it is ordained that "every person nominated to a junior situation should obtain a certificate of qualification before entering on his duties." The ordinary classes in Queen's College embrace the branches required in this Examination for the Civil Service.

Appendix, No 1.

Queen's College, Belfast, and Queen's University.

Special Courses have been arranged for students intending to become candidates for commissions in the Royal Artillery and Engineers, and for appointments to the Civil Service of India, both of which are now thrown open to public competition.

QUEEN'S UNIVERSITY IN IRELAND.

The charter founding the Queen's University in Ireland received the Royal sanction in the year 1850, and it provides that its Senate should have the power of conferring upon the students of the Queen's Colleges of Belfast, Cork, and Galway, such degrees and distinctions, in the Faculties of Arts, Law, and Physic, as are granted and conferred in other Colleges and Universities of Great Britain and Ireland. It further ordains that any of the students of the three Queen's Colleges, who shall have obtained such degrees in any of the several Faculties of Arts, Medicine, and Law, as shall be conferred by the Chancellor and Senate of the Queen's University, shall be fully possessed of all such rights, privileges, and immunities, as belong to similar degrees granted by other Universities or Colleges, and shall be entitled to whatever rank and precedence is derived from similar degrees granted by other Universities.

By the charter of the Queen's University, candidates for Degrees in Medicine are required to have attended *at least one-third of the Courses of Medical Lectures* in some one of the Queen's Colleges. For the remainder of the Courses of Medical Lectures, authenticated certificates will be received from the Professors or Lecturers in Universities, Colleges, or Schools, recognised by the Senate of the Queen's University in Ireland.

The Chancellor and Senate also have the power of admitting, by special grace, Graduates of other Universities to similar and equal degrees.

In order to obtain a degree or diploma in the Queen's University it is necessary to enter the College as a Matriculated Student, to pass the entrance or Matriculation Examination, and to pursue a fixed course of study.

The Matriculated Students may be classified as follow:—

I. Those intending to proceed to the Degrees of A.B. and A.M.
II. ,, ,, Degree of M.D.
III. ,, ,, Diploma of Elementary Law.
IV. ,, ,, Degrees of LL.B. and LL.D.
V. ,, ,, Diploma of Civil Engineering.
VI. ,, ,, Diploma of Agriculture.

THE SENATE.

Chancellor.—The Right Honorable George William Frederick, Earl of Clarendon, K.G., G.C.B., &c.
Vice-Chancellor.—The Right Hon. Maziere Brady, Lord Chancellor of Ireland, M.R.I.A., &c.
His Grace Richard, Archbishop of Dublin, D.D., M.R.I.A., &c.
The Right Honorable William, Earl of Rosse, K.ST.P., M.R.I.A., &c.
The Right Honorable Thomas Spring, Baron Monteagle of Brandon, M.A., F.R.S., Member of Senate of University of London, Comptroller of the Exchequer.
The Right Honorable Francis Blackburne, Lord Justice in Appeal, LL.D., V.C.T.C.D., M.R.I.A.
The Right Honorable David R. Pigot, Lord Chief Baron of the Exchequer, M.R.I.A.; &c.
The Right Honorable Sir Thomas Wyse, K.C.B.
The Rev. P. Shuldham Henry, D.D., President Queen's College, Belfast.
Sir Robert Kane, F.R.S., M.R.I.A., &c., President Queen's College, Cork.
Edward Berwick, Esq., President Queen's College, Galway.
Sir Richard Griffith, Bart., LL.D., M.R.I.A., Commissioner of Public Works.
Dominic J. Corrigan, M.D., M.R.I.A., Physician in Ordinary to the Queen in Ireland.
Major-General Sir Thomas Askew Larcom, R.E., C.B., LL.D., F.R.S., M.R.I.A., &c.
James Gibson, A.M., M.R.I.A., Barrister-at-Law.
Robert Andrews, Q.C., LL.D.
The Right Honorable James Henry Monahan, Lord Chief Justice of the Common Pleas.
Robert Adams, A.M., M.D.

Secretary.—G. Johnstone Stoney, M.A.—Office, Dublin Castle.

The Senate holds its sitting in Dublin Castle, where the examinations of the students of the three Colleges, for Graduation and University Exhibitions, are annually conducted by Examiners appointed by the Senate from year to year.

Appendix, No. 2.

APPENDIX, No. 2.

Return of Students attending each Class.

RETURN of the NUMBER of STUDENTS attending each CLASS in the Queen's College, Belfast, in each Year.

CLASS.	SESSION.					
	1849-50	'50-51.	'51-52.	'52-53.	'53-54.	'54-55.
Greek—1st year,	71	47	28	16	21	26
,, 2nd ,,	–	27	18	7	11	12
,, Higher,	–	–	–	–	–	–
Latin—1st year,	63	45	27	19	21	24
,, 2nd ,,	–	27	17	6	11	11
,, Higher,	–	–	–	–	–	–
The English Language,	52	46	28	20	24	28
History and English Literature,	–	–	25	15	20	16
Senior ,, ,,						
Modern Languages (French, German, Italian),	62	36	41	27	34	37
Senior ,,	–	20	28	16	15	15
The Celtic Languages,	*The Lectures in each Session open to the Public.*					
Mathematics—1st year,	86	58	40	25	29	33
,, 2nd ,,	–	12	11	11	13	11
,, Higher,	–	–	–	–	–	–
Natural Philosopby—Higher Class,	–	–	–	–	–	6
,, Mathematical Physics, &c.	32	32	46	24	29	23
,, Experimental Physics,	48	59	57	29	40	34
,, Practical Mechanics,	7	3	6	3	4	3
Chemistry,	37	53	68	44	51	60
Practical Chemistry,	6	7	14	10	15	14
Laboratory,	–	6	8	8	9	9
Zoology,	12	34	35	29	31	43
Botany,	12	49	46	35	37	46
Physical Geography,	–	–	29	17	21	19
Logic,	3	–	27	17	21	28
Metaphysics,	–	–	18	15	16	11
Higher Logic and Metaphysics,	–	–	6	7	7	8
Mineralogy and Geology,	*Public.*	6	14	13	15	13
Surveying,	10	9	9	6	6	9
Civil Engineering,	–	4	6	3	4	3
Theory of Agriculture,	11	8	7	2	6	5
Practice of Agriculture,	–	5	3	2	5	5
Diseases of Farm Animals,	–	5	3	2	5	5
Medical Jurisprudence,	2	8	14	10	13	8
Anatomy,	25	36	48	45	44	51
Practical Anatomy,	27	32	35	49	41	46
Practice of Medicine,	9	17	17	12	15	18
Practice of Surgery,	24	15	26	29	28	30
Materia Medica,	11	14	16	17	17	23
Midwifery,	14	10	12	16	17	18
Law of Property, Equity of Bankruptcy, Common and Criminal Law, Evidence and Pleading,	17	16	17	15	11	5
Jurisprudence and Political Economy, Arts,	–	–	12	2	9	6
Civil Law, Constitutional, Colonial, and International Law, Jurisprudence,	11	11	13	8	10	5
Arabic,	–	–	–	–	–	–
Hindustani,	–	–	–	–	–	–
Sanskrit,	–	–	–	–	–	–

APPENDIX, No. 2—*continued.*

Appendix, No. 2.

Return of Students attending each Class.

RETURN of the NUMBER of STUDENTS attending each CLASS in the Queen's College, Belfast, in each Year—*continued.*

CLASS.	SESSION.					
	'55–56.	'56–57.	'57–58.	'58–59.	'59–60.	'60–61.
Greek—1st year,	29	24	31	36	45	69
,, 2nd ,,	14	12	13	17	23	25
,, Higher,	–	–	–	5	4	4
Latin—1st year,	27	19	33	34	46	69
,, 2nd ,,	13	10	11	18	22	23
,, Higher,	–	–	–	2	3	2
The English Language,	31	24	36	41	49	72
History and English Literature, Senior ,, ,,	20	19	20	24	24	28
Modern Languages (French, German, Italian),	29	40	40	50	76	140
Senior ,,	19	12	16	13	17	10
The Celtic Languages,	*The Lectures in each Session open to the Public.*					
Mathematics—1st year,	30	35	39	45	61	83
,, 2nd ,,	15	17	16	14	13	13
,, Higher,	–	–	–	4	6	3
Natural Philosophy—Higher Class,	6	8	7	4	9	–
,, Mathematical Physics, &c.	24	19	26	25	24	64
,, Experimental Physics,	36	37	41	28	42	87
,, Practical Mechanics,	3	2	7	3	4	4
Chemistry,	50	70	60	74	81	64*
Practical Chemistry,	12	10	11	14	21	21
Laboratory,	10	15	10	11	10	12
Zoology,	31	43	34	63	56	37*
Botany,	36	44	34	62	55	40*
Physical Geography,	20	21	28	23	28	30
Logic,	20	27	22	29	29	35
Metaphysics,	17	20	15	19	15	24
Higher Logic and Metaphysics,	6	7	9	8	–	–
Mineralogy and Geology,	9	20	13	11	16	7†
Surveying,	4	15	7	7	–	9
Civil Engineering,	4	2	7	3	4	4
Theory of Agriculture,	5	4	7	7	7	6
Practice of Agriculture,	1	1	3	1	4	3
Diseases of Farm Animals,	1	1	4	2	3	2
Medical Jurisprudence,	10	15	16	13	17	14
Anatomy,	44	39	39	59	60	86
Practical Anatomy,	63	33	41	44	62	50
Practice of Medicine,	33	27	19	22	29	25
Practice of Surgery,	48	32	30	29	39	51
Materia Medica,	25	11	18	22	27	23
Midwifery,	24	13	7	17	14	26
Law of Property, Equity of Bankruptcy, Common and Criminal Law, Evidence and Pleading,	10	14	12	13	16	16
Jurisprudence and Political Economy, Arts,	8	2	18	9	7	10
Civil Law, Constitutional, Colonial, and International Law, Jurisprudence,	9	10	10	11	17	10
Arabic,	–	–	–	–	1	–
Hindustani,	–	–	–	–	2	3
Sanskrit,	–	–	–	–	6	3

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* No Arts Students this Session, owing to change of Statutes.
† No Engineering Students this Session, owing to change of Statutes.

Appendix, No. 3.

Fees received by Professors.

APPENDIX,

RETURN of the AMOUNT of FEES received by each

Professor of	1849–50.			1850–51.			1851–52.			1852–53.			1853–54.		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
Greek,	*88	10	0	83	0	0	50	0	0	27	5	0	38	5	0
Latin,	*73	15	0	79	0	0	50	10	0	31	5	0	38	5	0
English History and Literature,	50	5	0	50	5	0	47	10	0	31	5	0	43	5	0
Logic and Metaphysics,	6	0	0	–			†59	5	0	34	5	0	37	15	0
Mathematics,	116	15	0	97	10	0	69	15	0	43	0	0	54	10	0
Natural Philosophy,	79	5	0	70	15	0	99	10	0	47	0	0	73	15	0
Chemistry, Practical Chemistry,	85	5	0	104	0	0	117	5	0	91	10	0	111	10	0
Anatomy & Physiology Practical Anatomy,	143	0	0	170	0	0	195	15	0	230	10	0	228	0	0
Natural History and Botany,	20	10	0	69	0	0	70	15	0	50	15	0	55	0	0
Modern Languages,	97	0	0	84	0	0	63	0	0	50	0	0	61	0	0
Mineralogy and Geology,	–			7	10	0	24	15	0	17	15	0	20	15	0
Jurisprudence and Political Economy,	20	0	0	21	0	0	35	15	0	18	15	0	28	0	0
English Law,	32	0	0	29	0	0	37	0	0	23	0	0	20	0	0
Civil Engineering,	16	0	0	24	10	0	22	0	0	14	0	0	17	15	0
Agriculture and Medical Jurisprudence,	15	10	0	41	0	0	49	5	0	22	0	0	46	0	0
Practice of Medicine,	17	0	0	31	0	0	32	0	0	18	0	0	30	0	0
Surgery,	41	0	0	21	10	0	36	0	0	51	0	0	43	0	0
Materia Medica,	22	0	0	28	0	0	26	0	0	29	0	0	33	0	0
Midwifery,	28	0	0	18	0	0	22	0	0	27	0	0	31	0	0
Teacher of Drawing,	–			–			–			–			–		

* In the Session of 1849–50, Medical Students were required to attend the Greek and Latin Classes, but have since been exempt from attending either class.

† Professor M'Cosh was appointed in Session 1851–52, and taught and received fees from Students properly belonging to the previous Session.

Queen's College, Belfast, March, 1861.

Appendix No. 4.

Expenditure of One Year's Additional Grant.

APPENDIX,

ACCOUNT of the EXPENDITURE of ONE YEAR'S ADDITIONAL GRANT of

1. Library of Ancient and Modern Literature and Philology:

	£	*s.*	*d.*
Ancient Classical Languages and Philology,	79	10	6
English History and Literature,	35	13	2
Foreign Modern Languages,	27	5	9
Works of General Interest, &c.,	162	4	0
	304	13	7

2. Libraries, Museum, &c., Mathematical, Physical, and Chemical Sciences:

Mathematical Library,	38	5	4
Physical Library,	42	3	9
Chemical Library,	34	6	0
Museum and Cabinet of Physical Science,	24	6	0
,, Laboratory, Chemical Science,	43	5	5
	182	6	6

No. 3.

Appendix, No. 3.

Professor in the Queen's College, Belfast, in each Year.

Fees received by Professors.

1854-55.			1855-56.			1856-57.			1857-58.			1858-59.			1859-60.			1860-61.		
£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
46	5	0	51	15	0	44	15	0	51	0	0	78	0	0	*93	5	0	*131	15	0
44	5	0	47	15	0	39	15	0	53	0	0	67	0	0	†90	0	0	127	15	0
45	5	0	59	5	0	43	15	0	57	10	0	69	0	0	94	15	0	117	5	0
41	0	0	41	15	0	48	5	0	46	15	0	68	10	0	39	0	0	58	10	0
59	0	0	60	10	0	62	15	0	89	10	0	97	10	0	139	10	0	156	0	0
76	15	0	59	10	0	62	15	0	72	0	0	66	10	0	61	5	0	180	10	0
131	15	0	105	10	0	133	0	0	113	10	0	147	5	0	184	0	0	167	0	0
250	0	0	256	0	0	181	0	0	206	0	0	262	10	0	307	0	0	427	10	0‡
76	15	0	59	10	0	58	0	0	52	10	0	105	5	0	94	10	0	70	0	0
85	0	0	74	0	0	86	0	0	96	0	0	120	0	0	159	10	0	277	0	0
18	0	0	12	10	0	37	0	0	20	5	0	21	15	0	24	15	0	11	10	0
14	10	0	29	5	0	22	10	0	31	15	0	28	10	0	36	10	0	28	10	0
18	0	0	21	0	0	27	0	0	21	0	0	25	0	0	28	0	0	28	0	0
21	0	0	13	10	0	27	0	0	22	0	0	22	15	0	24	15	0	32	0	0
32	15	0	26	0	0	25	10	0	40	5	0	81	5	0	47	0	0	43	0	0
30	0	0	56	0	0	43	10	0	26	0	0	37	0	0	44	0	0	37	0	0
43	0	0	74	0	0	42	10	0	34	0	0	46	0	0	65	10	0	79	13	0
43	0	0	45	0	0	20	0	0	34	0	0	39	0	0	50	0	0	60	0	0
33	0	0	44	0	0	24	0	0	12	0	0	28	0	0	25	0	0	48	0	0
	–			–		32	0	0	25	0	0	26	0	0	22	0	0		–	

* Besides for Sanskrit and Hindustani for 1859-60, £35, and for 1860-61, £22 10*s.*

† Besides for Arabic in 1859-60, £5.

‡ The Professor of Anatomy pays to his Demonstrator a portion of the fees for Practical Anatomy.

§ No endowment for Medical Jurisprudence. Professor Hodges delivers the lectures, receiving only class fees.

ALEXANDER DICKEY, *Bursar.*

No. 4.

Appendix, No. 4.

£1,600, to the Queen's College, Belfast, ending 31st March, 1860.

Expenditure of One Year's Additional Grant.

3. Libraries, Museum, and Collection of Objects of the Department of the Natural Sciences:

	£	*s.*	*d.*
Library of Natural History,	38	14	10
,, Geology and Mineralogy,	28	13	11
Museum of Natural History,	47	17	0
,, Geology and Mineralogy,	51	10	2
,, Materia Medica,	19	11	8
,, Arts,	24	2	0
	210	9	7

4. Libraries, Museums, and Collections of Objects of the Departments of Engineering and Agriculture:

	£	*s.*	*d.*
Library of Engineering,	25	12	8
,, Agriculture,	19	14	6
Instruments and Collections of Engineering,	44	16	2
Collections of Agriculture,	22	14	5
	112	17	9

Appendix, No. 4.

Expenditure of One Year's Additional Grant.

APPENDIX, No. 4—*continued.*

ACCOUNT of the EXPENDITURE of ONE YEAR'S ADDITIONAL GRANT of £1,600, to the Queen's College Belfast, ending 31st March, 1860—*continued.*

	£	s.	d.
5. Museum and Library of Medical Science:			
Library of Medical Works,	92	14	1
Anatomical and Pathological Museums, and Rent of Anatomical Rooms,	82	18	1
Surgical Museum,	17	12	0
Midwifery,	15	0	0
Medical Jurisprudence,	13	4	6
	221	8	8
6. Library of Metaphysical, Legal, and Economical Science:			
Law, Jurisprudence, and Political Economy,	36	2	10
Metaphysics,	36	2	10
	72	5	8
7. Printing, Stationery, Advertising, Postages, Office Expenses, &c.,	305	15	7
8. Heating and Lighting,	117	10	6
9. Botanic Gardens, £50; Grounds, £51 6*s.* 5*d.*,	101	6	5
	1,628	14	3
Balance in Bank of Ireland Office, 31st March, 1860,	305	18	7
Total,	1,934	12	10

	£	s.	d.
Amount of One Year's additional Grant,	1,600	0	0
College and Matriculation Fees,	81	0	0
Received for Calendars, Catalogues, &c., sold, and Fines,	23	5	0
Balance in Bank, 31st March, 1859,	230	7	10
Total,	1,934	12	10

The Accounts of the College up to 31st March, 1860, have been examined and found correct, by the Commissioners for Auditing the Public Accounts.

March, 1861.

ALEXANDER DICKEY, *Bursar.*

APPENDIX, No. 5.

General Class Examinations, Queen's College, Belfast.

	Session 1859–60.			A.M.	P.M.	Session 1860–61.			A.M.	P.M.
The English Language,	Saturday,	January	7	—	12—4	Saturday,	January	5	—	12—4
Logic,	Saturday,	February	11	9—12	—	Saturday,	February	16	9—12	—
Zoology,	Saturday,	March	10	9—12	—	Monday,	March	25	9—12	—
Metaphysics,	Tuesday,	April	3	9—12	and 2—5	Tuesday,	March	26	9—12	and 2—5
Physical Geography,	Saturday,	January	14	9—12	—	Wednesday,	March	27	9—12	—
Mineralogy and Geology,	Wednesday,	April	4	—	2—5	Wednesday,	March	27	—	2—5
History and English Literature,	Thursday,	April	5	9—12	and 2—5	Thursday,	March	28	9—12	and 2—5
Midwifery,	Thursday,	April	26	9—12	—	Friday,	April	26	9—12	—
Practice of Medicine,	Thursday,	April	26	—	2—5	Friday,	April	26	—	2—5
Anatomy and Physiology,	Friday,	April	27	9—12	and 2—5	Saturday,	April	27	9—12	and 2—5
Practical Anatomy,	Saturday,	April	28	9—12	—	Monday,	April	29	9—12	—
Practice of Surgery,	Saturday,	April	28	—	2—5	Monday,	April	29	—	—
Materia Medica,	Monday,	April	30	9—12	—	Tuesday,	April	30	9—12	—
Medical Jurisprudence,	Monday,	April	30	—	2—5	Tuesday,	April	30	—	2—5
Practical Chemistry,	Saturday,	April	14	9—12	—	—	—		—	—
Greek (First Year),	Thursday,	May	31	9—12	and 2—5	Thursday,	May	30	9—12	and 2—5
„ (Second Year),	Friday,	June	1	9—12	„ 2—5	Friday,	May	31	9—12	„ 2—5
Latin (First Year),	Friday,	June	1	9—12	„ 2—5	Friday,	May	31	9—12	„ 2—5
„ (Second Year),	Thursday,	May	31	9—12	„ 2—5	Thursday,	May	30	9—12	„ 2—5
Natural Philosophy,	Friday,	June	1	9—12	„ 2—5	Friday,	May	31	9—12	„ 2—5
Surveying,	Friday,	June	1	9—12	—	Friday,	May	31	9—12	—
Mathematics (First Year),	Saturday,	June	2	9—12	and 2—5	Saturday,	June	1	9—12	and 2—5
„ (Second Year),	Saturday,	June	2	9—12	„ 2—5	Saturday,	June	1	9—12	„ 2—5
„ „	Monday,	June	4	9—12	—	Monday,	June	3	9—12	—
Modern Languages,	Monday,	June	4	9—12	and 2—5	Monday,	June	3	9—12	and 2—5
Chemistry,	Tuesday,	June	5	9—12	„ 2—5	Tuesday,	June	4	9—12	„ 2—5
Botany,	Wednesday,	June	6	9—12	—	Wednesday,	June	5	9—12	—
Civil Engineering,	Wednesday,	June	6	9—12	—	Wednesday,	June	5	9—12	—
Practice of Agriculture,	Wednesday,	June	6	9—12	—	Wednesday,	June	5	9—12	—
Diseases of Farm Animals,	Wednesday,	June	6	9—12	—	Wednesday,	June	5	9—12	—
Theory of Agriculture,	Wednesday,	June	6	—	2—5	Wednesday,	June	5	—	2—5

General Examination of Students in Law, and also of Students in the Faculty of Arts, in Jurisprudence, and Political Economy, at the close of the Lectures on these subjects.

APPENDIX, No. 6.

RETURN of the NUMBER of LECTURES delivered by each Professor in the Queen's College, Belfast, in each YEAR.

	1849-50	'50-51.	'51-52	'52-53	'53-54.	'54-55	'55-56.	'56-57.	'57-58	'58-59	'59-60.	REMARKS.
Professor of— Greek, ...	135	232	244	246	236	240	234	235	236	340	500*	In addition, examining about 300 exercises each session.
Latin, ...	162	197	218	221	169	196	232	230	230	275	596	Do do.
History and English Literature, ...	35	55	98	61	104	100	105	105	98	110	123	
Modern Languages, . .	208	330	324	307	506	305	316	340	369	307	340	
Celtic, ...	6	6	6	6	6	6	6	6	6	6	6	Open to the Public without charge.
Mathematics, . . .	135	256	333	248	246	320	346	522	320	400	400	Besides two hours each week on which the Senior Scholar meets the Junior Division.
Natural Philosophy. . .	122	257	238	209	256	250	255	307	300	300	242	
Chemistry, ...	134	136	137	129	132	130	138	142	142	140	132	In addition, superintending the working pupils, of whom from eight to twelve are admitted each year by examination to the laboratory without charge.
Practical Chemistry, . .	36	36	36	36	36	36	36	36	34	36	36	
Natural History, . . .	120	120	133	137	139	138	142	140	143	140	140	Including lectures in Physical Geography, delivered free to all students (among whom are Engineering Students, who never pay this Professor any fee).

Logic and Metaphysics,	–	–	78	142	176	176	164	177	179	167	140	In addition, criticising above 250 Essays in each session.
Mineralogy and Geology,	*Public.*	86	94	59	54	55	49	59	52	52	52	In addition, daily attendance as Curator in the Museum.
Civil Engineering,	134	138	140	136	140	136	147	116	100	194	196	Including practical work under the direction of the Professor.
Agriculture,	172	206	205	212	209	213	216	188	190	166	166	Including lectures on Medical Jurisprudence and Diseases of Farm Animals, for neither of which there is any salary; in addition, practical excursions with students.
Anatomy and Physiology,	116	116	116	116	114	115	117	113	115	115	116	In addition, superintending the class of Practical Anatomy and Demonstrations and Dissections.
Practice of Medicine,	93	93	92	92	93	94	94	85	75	95	95	
Practice of Surgery,	93	94	93	61	61	92	94	94	94	94	94	Besides about twenty-five lectures each session on Operative Surgery.
Materia Medica,	92	91	91	93	90	90	92	80	84	64	84	
Midwifery,	92	92	62	91	90	55	93	93	93	95	90	Besides practical instruction to students which may be required at any hour throughout the year.
English Law,	24	48	72	95	93	96	96	95	96	95	72	No third year Class in 1859–60.
Jurisprudence and Political Economy,	24	48	96	120	120	120	120	120	120	95	120	

* Including about 150 on Sanskrit and Hindustani.

The above Return gives the number of Meetings of one hour each, in each Class. The system of instruction includes, not merely formal Lectures, but also examination in the business of the course; in some classes these examinations are held daily; in others on fixed days of the week, according to the nature of the subject.

The Professors also conduct the General Scholarship Examinations, and some of them, in addition, the Matriculation and Supplemental Examinations.

October Examinations of Queen's College, Belfast, 1860.

Days.	Hours.	First Year Students.	Second Year Students.	Third Year Students.	Fourth Year Students.
Tuesday, Oct. 15.	9—12		Suppl. Ex. English. Mod. Lang Math.	Suppl. Ex.—Chem., Math.	Senior Schol.—Latin.
	2—5		Suppl. Ex.—Greek—Latin.	Suppl. Ex.—Greek, Latin, Nat. Hist., Logic.	Senior Schol.—Latin.
Wednesday, Oct. 16.	9—12		Liter. Schol.—Greek.	Sci. Schol.—Logic	Senior Schol.—Greek.
	2—5		Liter. Schol.—Greek.		Senior Schol.—Greek.
Thursday, Oct. 17.	9—12		Med. Engin Agric. Schol.—Chem.		Senior Schol.—Chem.
	2—5	Matric.—Math.	Med. Engin. Agric. Schol.—Chem.		Senior Schol.—Chem.
Friday, Oct. 18.	9—12	Matric.—Greek, Latin.	Liter. Medic. Schol.—Mod. Lang.		Senior Schol.—Mod. Lang
	2—5		Liter. Medic. Schol.—Mod Lang		Senior Schol.—Mod Lang
Saturday, Oct. 19	9—12	Matric.—English.	Liter. Schol.—Latin Engin. Schol.—Geo Draw	Sci. Schol.—Math.	Senior Schol.—Mod. Hist.
	2—5	Matric.—English.	Liter. Schol.—Latin. Engin. Schol.—Geo Draw	Sci Schol.—Math.	Senior Schol.—Mod. Hist.

Monday, Oct. 21.	9—12		Med. Schol. Agric. Schol. } Botany		Senior Schol.—Nat. Hist.
	2—5	Lists of Matriculated Students to be made out.	Liter. Schol.—English. Agric. Schol.—Zool.	Med. Schol.—Zool.	Senior Schol.—Nat. Hist.
Tuesday, Oct. 22.	9—12	Science Med. Engin. } Schol.—Math. Agric. Schol.—Arith.	Science Engin. } Schol.—Math		Senior Schol.—Math.
	2—5	Science Med Engin. } Schol.—Math.	Science Engin. } Schol.—Math Med. Schol.—Anat. and Phy.	Liter. Schol.—Latin. Med Schol.—Anat. and Phy.	Senior Schol.—Math. Med. Schol.—Pr of Midw.
Wednesday, Oct. 23.	9—12		Agric. Schol.—Agriculture.	Liter. Schol.—Mod. Lang Med. Schol.—Prac. Chem.	Senior Schol.—Nat. Phil Med. Schol.—Pr of Med.
	2—5	Liter. Med. Agric. } Schol.—English.	Engin. Schol.—Exp Phys.	Sci. Schol.—Nat. Phil. Liter. Schol.—Mod. Lang. Med Schol.—Physics.	Senior Schol.—Nat. Phil.
Thursday, Oct. 24.	9—12	Liter Med } Schol.—Greek.		Liter. Schol.—Greek. Med. Schol.—Mat. Med.	Senior Schol.—Pol. Econ. Med. Schol.—Med. Juris.
	2—5	Liter Med. } Schol.—Latin.		Liter. Schol.—Latin.	Senior Schol.—Pol. Econ. Med. Schol.—Surg. Anat.
Friday, Oct. 25.	9—12	Liter Med. } Schol.—Latin			Senior Schol.—Metaph. Med. Schol.—Anatomy
	2—5	Liter Med. } Schol.—Greek.		Liter. Schol.—Greek.	Senior Schol.—Metaph. Med. Schol.—Physiology.

Students passing the Supplementary Examinations complete the previous year, and take rank accordingly

HOURS of LECTURES, Queen's College, Belfast,—SESSION 1860–61.

Hours.	Arts.			Civil Engineering.		Agriculture.		Medicine and Law.
	1st Year.	2nd Year	3rd Year.	1st Year.	2nd Year.	1st Year.	2nd Year.	
9 till 10	*French.* Monday Wednesday Thursday *German.* Tuesday Friday	*Mathematics.* Monday Tuesday Wednesday Thursday Friday		*French.* Monday Wednesday Thursday *German.* Tuesday Friday	*Mathematics* Monday Tuesday Wednesday Thursday Friday			
10 till 11	*Mathematics.* Monday Tuesday Wednesday Thursday Friday	*French.* Monday Wednesday Thursday *German.* Tuesday Friday		*Mathematics* Monday Tuesday Wednesday Thursday Friday			*Pr. of Agri. & Dis. F. Anim.* Tuesday Thursday	*Evidence and Pleading* Tuesday Thursday Saturday
11 till 12	*Latin.* Monday Wednesday Friday	*Greek.* Monday Thursday Friday	*Metaphysics.* Tuesday Wednesday Thursday Friday *History.* Monday Wednesday Friday		*Min. Geo. and Ph. Geog* Monday Wednesday *Civil Eng.* Tuesday Thursday Saturday	*Theo. of Agri.* Tuesday Thursday	*Min., Geog., & Ph. Geog.* Monday Wednesday *Surveying.* Saturday	*Prac. Chem.* Tuesday } 10-30 Thursday } till 11-30 Saturday 11 till 12 *Com. & Crim. Law.* Tuesday Thursday Saturday
12 till 1	*Greek.* Monday Thursday Friday	*Latin.* Monday Wednesday Friday	*Eng. Lit.* Monday Wednesday Friday	*Geo. Draw. and Office Work.* Tuesday Thursday	*Office and Field Work.* Tuesday Thursday Saturday		*Surveying* Saturday	*Mat. Med.* Saturday *Practical Anatomy.* Monday Tuesday Wednesday } 11-45 till 12-45 Thursday Friday
1 till 2	*English.* Monday Tuesday Wednesday Friday	*Exp. Phys.* Monday Wednesday Friday *Mat. Phys.* Tuesday Thursday	*Zool. and Bot.* Monday Wednesday Friday	*Exp. Phys.* Monday Wednesday Friday *Geo. Draw and Off* Tuesday Thursday	*Mat. Phys.* Tuesday Thursday *Office and Field Work.* Saturday	*Zool. and Bot.* Tuesday Wednesday Friday	*Ex. Physics* Monday Wednesday Friday *Surveying* Saturday	*Zoology and Botany.* Monday Wednesday Friday *Ex. Phys.* Monday Wednesday Friday

of Queen's College, Belfast.

2 till 3		*Logic.* Tuesday Wednesday Thursday Friday	*Pol. Econ.* Tuesday Thursday Friday					*Anatomy and Physiology.* Monday Tuesday Wednesday Thursday Friday
3 till 4			*Chemistry.* Monday Tuesday Wednesday Thursday Friday	*Chemistry.* Monday Tuesday Wednesday Thursday Friday		*Chemistry.* Monday Tuesday Wednesday Thursday Friday		*Midwifery.* Monday Tuesday Thursday Friday *Chemistry.* Monday Tuesday Wednesday Thursday Friday *Med. Juris.* Wednesday Saturday
4 till 5			Chemical Laboratory, open from 9 A.M. till 3 P.M.					*French.* Monday Thursday *Pr. of Med.* Monday Tuesday Wednesday Thursday *Mat. Med.* Friday
5 till 6								*Surgery.* Wednesday Thursday Friday Saturday *Materia Medica.* Monday Tuesday *Equity & Bank.* Monday Wednesday Friday
6 till 7								*Civil Law.* Monday Wednesday Friday *Law of Prop.* Monday Wednesday Friday
7½ till 8½			*Jurisprud.* Monday Wednesday Friday					*Jurisprudence.* Monday Wednesday Friday
8½ till 9½								*Cons. & Col. Law.* Monday Wednesday Friday

The hours of the Medical Classes may possibly be changed at the commencement of next Session, of which due notice will be given.

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Digest of Subjects and Courses.

APPENDIX, No. 7.

An Enlarged Digest of Subjects and Courses pursued in Queen's College, Belfast.

Greek—*Professor, Charles MacDouall,* LL.D., M.R.A.S.

In the Greek Class, as in all those which are attended during more than one session, the business, as well as the hours assigned to the Students of the different years, is necessarily different; but it is always distributed into three simultaneous processes, viz., public examinations, lectures more or less formal, and exercises written at home and commented on in the class.

In the first session, the complex and self-contained structure of the Greek language is subjected to a close analysis; carried out, on the one hand, by tracing words to their crude forms, by classifying terminations, both the primary and the flexional, and by discriminating among analogically correct forms those actually used in different ages and dialects; on the other hand, by exhibiting the methods by which words are combined in simple clauses, clauses are knit into sentences, and sentences compose periods less or more complicated. Some prose-work furnishes the materials for this analysis; while the Students read and translate it, or else re-translate off-hand passages read out in English before them by the Professor. Besides syntactical phænomena, the laws and characteristics of both epic and dramatic versification are expounded and exemplified, while a portion of the *Ilias* and some tragedy are used as text-books.

In the second session, while consecutive passages of Herodotus along with some Attic oration or philosophical treatise, and a book of the *Odysseia* along with some Attic tragedy or comedy, form the basis of prelectious, the previous discipline is continued and extended; the distinctions of dialect and style are more fully elucidated; the origin, growth, and fortunes of the epos, the drama, history, and other departments of literature, are more distinctly unfolded; discussions on points of mythology, geography, chronology, archæology, æsthetics, &c., are more freely introduced and more amply treated. The Students are required to turn Herodotean Greek, at sight, into Attic, altering both the forms of words and the structure of sentences; to re-translate passages into Greek prose and verse; and also to give in original essays in both forms of composition.

Considering the variety of subjects which enter simultaneously into the first and second Sessions of the Collegiate Course, the Students generally appear to give a fair share of their attention to the Greek Language and Literature. Several times in the week a considerable number voluntarily attend extra Lectures, at which no note is taken of their presence or of their absence.

In a distinct or higher class, advanced Students, generally in the third or fourth year of their Course, are exercised in the study of more difficult works than those previously read, in the higher problems of criticism and philology, and especially in composing both prose and verse.

Sanskrit and Hindustani.

The Classes for these Languages (conducted by the Professor of Greek) are at present attended by Students who either have already obtained, or are preparing to compete for, Appointments in the Indian Service. As the importance of some practical acquaintance with Sanskrit, especially in relation to Classical Studies and to Comparative Philology, is now generally recognised, the Sanskrit Class will doubtless be frequented hereafter by others also who can spare the time and attention which it requires.

Either Class may be attended separately; or a two-years' Course may be taken, in which Sanskrit alone is studied during the first year, and Sanskrit, with Hindustani (including the elements of Persic), occupy the second.

LATIN—*Professor, Charles Parsons Reichel,* D.D.

The Course read in the Latin Classes during the Session of 1859–60, was—

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Senior Class.—Cicero de Finibus, Books I., II.; Lucretius, Book V.; Cicero de Oratore, Book I.

Junior Class.—Cicero's Letters to Atticus, Books I., II.; Terence, Phormio; Tacitus, Annals, Book I.; Virgil, Georgics, Book I.

The Junior Class is that composed of Students of the *First Year;* the Senior, that composed of Students of the *Second Year.*

The Professor, therefore, has each set of Students only two years, at most, under his care; no attendance on Lectures in Latin or Greek being required of Students in their Third Year.

The Professor requires the Class to prepare for each Lecture a certain portion of the authors in course of being read. The Professor sometimes translates to the Class, sometimes requires them to translate aloud, making such corrections and observations as may he necessary fully to explain the passage, and to throw light on the idiom of the author, and the structure and analogy of the language.

Besides this, full statements of the historical and legal points involved in the authors read, are furnished by him.

A Composition Class is held once a-week for the Senior, and twice a-week for the Junior Class, attendance at which is voluntary.

An advanced Latin Class has been formed during the last three Sessions, attended by Students of the third or fourth year, who may wish to carry on the study of the Latin language beyond the point at which the prescribed course leaves them. This Class cannot be numerously attended, as the time of Students of the Third Year is so much taken up with their prescribed Courses in other branches—those who attend it have to do so under the greatest difficulty; and probably nothing but the impossibility of successfully competing with Students from other Universities, without a greater knowledge of Latin than the regular College Course will enable them to acquire, has induced any Students to attend it.

The Professor is happy in adding that the deficiencies in the Classical Departments of the Library and Museum are being remedied.

ARABIC.

The Professor of Latin has this Session begun an Arabic Class, and hopes that the attention of many Students may in time be attracted to this important language, which occupies in the East much the same position as French does in Europe.

HISTORY AND ENGLISH LITERATURE—*Professor, George Lillie Craik,* LL.D.

The Professor of History and English Literature has two Classes: one entitled the Class of the English Language, which is taught for one Term, and is attended, according to the Curriculum for Degrees in Arts, by Students of the First Year; the other entitled the Class of History and of English Literature, which is taught for two Terms, and is attended by Students of the Third Year.

It is important to observe, that by this arrangement there is added, to the two distinct subjects which are combined in the designation of the chair, a third subject perfectly distinct from either; each of the three, at the same time, like every other great department of human knowledge and speculation, having several subdivisions.

I. The Class of the English Language is taught by means of—

1. A Course of Lectures on the origin, history, and constitution of the language, and on the principles of Universal Grammar.
2. Examinations on a printed text-book, prepared by the Professor, entitled, "Outlines of the History of the English Language."
3. Exercises in Composition, both in prose and verse; and
4. A Course of Critical Readings, directed more especially to the philology of the language, both in its principles and in its details.

The business of the Class, thus conducted, may be stated to comprehend the subjects of Universal Grammar, or the Philosophy of Language generally, with

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the Elements of Comparative Grammar and of Linguistic Ethnology, the Philology of the English Language, and the Practice of English Composition.

For the completion of the Course, it has been found necessary to have voluntary meetings once a-week throughout the Second Term, which have been hitherto attended, with few exceptions, by the whole Class.

II. In the Class of History and of English Literature, the teaching of History has hitherto embraced the Outlines of Historical Geography; the Elements of Chronology; a Sketch of the General History of the World; a Course of Lectures on the Science of Historical Investigation; and a minute survey, by way of illustration, of various portions of the History of England, including the progress of the constitution and of society, as well as the course of public events and transactions, with special reference to the original authorities, and to the bibliography of the subject. No text-book has been used, but examinations are regularly held, the Students being left to collect the facts necessary to be remembered from the Lectures, and from any of the common histories.

The subject of English Literature is treated both historically and in reference to the principles of æsthetic and critical science. For the history of our literature, a work of the Professor's, entitled "Sketches of the History of Literature and Learning in England," is employed as a text-book; and a Course of Lectures is delivered on the subject of Literature as one of the forms of the Artistic. There are regular examinations both on the text-book and on the Lectures; and essays, or other exercises in writing, are exacted throughout this part of the Course. In the Session of 1859–60 the Professor also opened a class for superintending and directing the reading of students preparing for the public examinations, which meets once a-week throughout the First and Second Terms.

MODERN LANGUAGES—*Professor, Mathias Joseph Frings,* PH.D.

The foreign Modern Languages taught up to the present day are French, German, and Italian. The Students generally select the former for their College Course; one-fourth of the Class, on an average, however, take up both languages; few take German alone.

The mechanism and peculiarities of the respective languages are carefully illustrated by the Professor, who is unremittingly endeavouring to enable the Students to think in that language which they are pursuing. To effect this, the Students are made to translate more frequently from their mother tongue into the one to be acquired than *vice versâ*, and orally return, without delay, in French or German, any sentence that may be proposed in English.

The Professor also occasionally delivers a Lecture on the History of French or German Literature, or Language. On all these topics the Students are frequently examined.

The books recommended are, plays from Göthe, Schiller, Wieland; from Corneille, Racine, and Molière; Dante, Goldoni, Manzoni; also historical writings in both languages. Some one of these books is critically read aloud once a week, by the Students, and turned by them into English.

The result of these proceedings, considering the very short time allowed, has generally proved satisfactory. At the end of the Session the Students who, almost all, began, as it were, with A, B, C, were able to translate tolerably well an easy French, Italian, or German author, and also generally made a good attempt at turning the English into the Modern Language. They were also pretty well acquainted with the leading features of the history of that language which they have been pursuing, and satisfactorily answered the principal questions of its grammar.

The Students attending to the Modern Languages during one Session only, and beginning, so to say, at the very foot of the hill, have, unfortunately, no time left to enter the field for Comparative Grammar.

Also, three Courses for Senior Students who are required to attend a more extended course for the Degree of A.M., are delivered in German, French, and Italian.

There is an Evening Course for Medical Students who are not able to attend the Course for the Students of Arts.

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CELTIC LANGUAGES—*Professor, John O'Donovan,* M.R.I.A.

The Professor delivers a series of Lectures in each Session on the Irish Language. These Lectures are open to the public.

MATHEMATICS—*Professor, George M. Slesser,* B.A., F.C.P.S.

Attendance on this Class is prescribed to all Students in the Faculty of Arts during the first year of their Course; during the second year they are required to attend either a higher Course of Mathematics, or of Latin and Greek.

All Students in the Department of Engineering are required to attend the Mathematical Classes during two years.

Before entering, Students are required to pass an examination in the First and Second Books of Euclid, and in a small portion of Algebra. Practically they are generally well prepared in the prescribed portions of Euclid, while, on the contrary, it has been necessary, with a large portion of the Class, to commence the instruction in Algebra from the very beginning. A considerable number of the Students are Candidates for Mathematical Scholarships at entrance, and these are generally well prepared in the first six Books of Euclid, and a considerable portion of Algebra and Plane Trigonometry.

On this account the instruction of the First Year in Mathematics has been given in two Divisions. The Lower Division has been carefully taken through such portions of Euclid I., II., III., IV., VI., as they had not previously prepared, and has received instructions in Algebra as far as the progressions, and in Plane Trigonometry as far as the solution of triangles, with the use of logarithms and trigonometrical tables. The instruction of the Upper Division comprises a complete Course of Algebra and Trigonometry, with the principal historical properties of the Conic Sections, treated geometrically.

The Council has sanctioned the employment of the Senior Mathematical Scholar in giving a portion of the instruction of the Lower Division. This arrangement, while it affords a greater number of hours to the Lower Division, enables the Professor of Mathematics to give more attention to the Upper Division, and has been found to work very satisfactorily.

In the Second Year the subjects of Lecture are Analytical Geometry, the Differential and Integral Calculus, and the first three sections of the Principia of Newton; and, in addition to this, when the progress of the Students has been sufficiently rapid during the early part of the Session, the solution of the simpler kinds of Differential Equations, and the principles of Analytical Geometry of Three Dimensions. Spherical Trigonometry and the Theory of Equations are not included in the subjects of Lecture, but are required from the Candidates for Science Scholarships of the Third Year.

The instruction is carried on in great part by questions, which the Students are required to work out at the time, under the eye of the Professor, the questions having reference to those portions of the subject which have just been treated in the Lectures. The Professor then corrects their work, and gives such hints and explanations as are requisite.

During the last two Sessions, at the request of a few advanced Students, a third and higher class has been formed. The subjects of lecture have been Geometry of three dimensions, Finite Differences, Calculus of Functions, Calculus of Variations, and extended courses of Definite Integrals, Differential Equations, and Theory of Probabilities.

THE PHYSICAL CLASSES—*Professor, John Stevelly,* LL.D.

The subjects taught in the Physical Classes are distributed under three subdivisions: Mathematical Physics, Experimental Physics, and Natural Philosophy applied.

The subjects comprised in the Course of Mathematical Physics are—Mechanics (under its several statical and dynamical subdivisions), Hydrostatics, Hydraulics, Pneumatics, Acoustics, Optics, and Astronomy. The Students who attend this class are the Matriculated Students who are seeking a Degree in Arts, the Engineering Students of the Second Year, and Non-Matriculated Students, some of whom are Candidates for the ministry in the Presbyterian Churches. Attendance at the Lectures three days in each week is imperative

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on all those Students, and one hour in each week is occasionally employed in asking questions from prescribed parts of Galbraith and Haughton's Manual. Two days in the week attendance is optional, when Analytical Mechanics and the higher branches of Physics are taught. In the Lectures, attendance on which is imperative, such mathematical proofs and illustrations only are introduced as a person reasonably prepared in the six first Books of Euclid and Elementary Algebra might easily comprehend. The teaching is by prælection; and although no text-books are prescribed, the ordinary elementary works on the several subjects are pointed out and referred to. At the Lectures, attendance on which is voluntary, the demonstrations and investigations are pursued in a more systematic and mathematical method, so as to require a knowledge of Analytic Geometry, Conic Sections, and the Differential and Integral Calculus. Text-books are used for the guidance of the Students attending these Lectures, who are chiefly those who are intending to compete for Honors. These text-books are Earnshaw's and Todhunter's Statics, Wilson's Dynamics, Tait's Dynamics of a Particle, Miller's Hydrostatics, Lloyd's Optics and lectures on the wave theory of light, Herschell's Astronomy, and two of Airy's Tracts, with occasional reference to Du Hamel's Cours de Mecanique, and to Poisson's Works.

The Class of Experimental Physics is attended by the same Students, and also by Agricultural Students of the Second Year, and by Medical Students of the Third Year. The subjects of these Lectures are taught entirely without mathematical demonstration, by the aid of experiments, illustrations, drawings, and models, and such works as Lardner's Hand-book, Golding Bird's Physics, Webster's Physics, Miller's Chemistry, Vol. I., Arnott's Elements, Biot, Ganot, Pouillet, Peschel, and such like standard works are referred to, and recommended to the attention of the Students. The subjects of Heat, Electricity, and Electro-Magnetism are at present chiefly taught in the Chemical Class; but the leading facts and principles are taught by selections from Biot, Pouillet, Ganot, and Miller.

The Class of Natural Philosophy applied is intended for Students in Engineering of the Third Year, by the recent University ordinance; lectures and instructions twice in the week. The subjects embraced are the nature and estimate of work done; the kinds of work required to be done; the nature and laws of friction, and other useless resistances; the moving powers at our command, their respective nature and the laws which govern their action; the manner in which they are, by machinery, connected with and opposed to the resistances; the construction of machines; the principles of strength of materials as opposed to strains; the equilibrium of structures, frames, roofs, arches, domes; the general principles of mechanism; general maxims in the structure and working of machines; maximum effects of machines; hydraulic engines; the steam engine. The works used as guides to the studies of the Students in this Class are selections from Lloyd's and Robinson's Mechanics, Willis's Principles of Mechanism, Barlow on Materials and Construction. Hodgkinson's Experimental Researches, Tredgold, Tate's Elementary Treatises and Exercises, and selected numbers of Weale's Rudimentary Series.

CHEMISTRY—*Professor, Thomas Andrews*, M.D., F.R.S., M.R.I.A.

In the Class of Chemistry the greater part of the Course is devoted to pure Chemistry; but the Elements of the Sciences of Heat and Electricity, particularly in their relations with Chemistry Proper, are also taught. The application of these sciences to the arts are particularly referred to; and it has been the constant endeavour of the Professor to communicate to the Students as precise and accurate information as possible on the subjects treated in his Lectures, and to train them to habits of careful observation and accurate thinking. With this view a weekly examination of the whole Class is held, at which the Students are subjected to a searching examination on the business of the preceding week; and further to encourage a taste for scientific inquiry, and also to train a certain number of practical chemists, a limited number of the best Students are admitted, by examination, as working pupils into the chemical laboratory, where they have an opportunity of acquiring a knowledge of chemical analysis. This latter arrangement has now been in practice for several years, and has already been attended with the best results.

NATURAL HISTORY—*Professor*—[*Vacant.*]

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The Zoological Department of the Course occupies the First Term and greater part of the Second, and comprehends the Outlines of Anatomy and Physiology of animals, followed by Systematic Zoology, and remarks on the distribution of animals.

The Botanical part comprehends Vegetable Anatomy and Physiology, Systematic Botany, and distribution of vegetable forms. In addition to the Class Lectures (four days for Arts and five for Medical Students), meetings are held in the Botanic Garden, and practical excursions made into the neighbouring country.

The subject of Physical Geography is supplemental to the above Courses, and is delivered to Arts Students of the Third Year during the First Term of the Session.

This Course comprehends chiefly Lectures on the structure and form of continents and islands; the distribution of mountain systems, rivers, and lakes; the ocean, its currents, temperature, &c.; the atmosphere, its currents, &c.; rain, snow, &c. The preceding subjects are considered in relation to the geographical distribution of animals and plants.

These different branches are illustrated by specimens, or drawings, or both, as the case may be.

LOGIC AND METAPHYSICS—*Professor, Rev. James M'Cosh,* LL.D.

LOGIC.

Students attend this Class four days each week during twelve weeks of the Second Session. On two of these days there are examinations on a text-book of Formal Logic, with short prelections on the said text-book, and also the oral explanation of philosophic terms, the reading of Essays by the Students, and the criticism of them by the Professor. On the other two days the Professor delivers written Lectures. This Course of Lectures is divided into two parts: FIRST, GENERAL LOGIC, or an Exposition of the Laws of Thought in general, that is, whatever be the object of thought, embracing Notions, Judgment, and Reasoning; SECONDLY, PARTICULAR LOGIC, or the Development of the Laws of Thought, as directed to particular classes of objects, comprising Demonstrative Evidence, Probable Evidence, Induction, Analogy, Teleology, and the Relation of the Oraganon of Bacon to that of Aristotle. The prominent topic in the second part is the Method of Induction, which is treated under the heads:—I. The Means, being generally Systematic Observation, and more particularly Analysis, Observation Proper, Experiment, Hypothesis, Explication of the Conception. II. The End, being the Discovery of Classes (as in Natural History, &c.), or Causes (as in Natural Philosophy, &c.). III. The Canons of Classes and Causes by which we may reach the End by the Means. The Students are required to give in a short written essay once a fortnight. At the Pass Examination, at the close, about one-half of the questions bear upon subjects discussed in the text-book, and the other half upon topics explained in the lectures.

METAPHYSICS.

This Class meets four days each week, and an hour each day, during the first two terms of the Session, and is attended by Students of the Third Year. On one of these days there is a rigid examination, with interspersed remarks by the Professor, on the second half of the Epitome of the History of Philosophy, sanctioned by the University of France (translated by Henry). In this part of the text-book there is an abstract of the doctrines of the more eminent philosophers who have flourished in this country, and on the Continent of Europe, from the time of Bacon to the present day. On another of these days there is an examination on the written lectures, together with the reading and criticism of essays; the Students being required to give in a carefully written essay every fortnight to the Professor, who reads it at home, and selects certain portions of it to be read in the class, where he criticises it. These essays are on the leading subjects discussed in the written lectures. On the other two days the Professor delivers carefully prepared written lectures. He begins the course with a few lectures on the Method of Investigation, which is that of Induction, and on Mind and Body,

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and then proceeds to divide his course into two parts, PSYCHOLOGY and METAPHYSICS PROPER.

Under PSYCHOLOGY he treats (1) of the Powers or Faculties of the Mind, and (2) of the Laws of the Succession of Thought. He classifies the faculties as follows:—I. The Simple Cognitive Faculties: (*a*) Perception; (*b*) Consciousness. II. The Reproductive Faculties: (*a*) Memory; (*b*) Imagination; (*c*) Symbolic Power. III. The Faculties which Discover Relations: (*a*) of Identity and Difference; (*b*) of Whole and Parts (to which we owe abstractions); (*c*) of Space; (*d*) of Time; (*e*) of Quantity; (*f*) of Resemblance (to which we owe the Discovery of Classes); (*g*) of Active Property; and (*h*) of Cause and Effect. IV. The Conscience. V. The Emotions; and VI. The Will. In this course of lectures, which occupies two-thirds of the session, the method of operation and peculiarities of these mental attributes are carefully pointed out.

Under METAPHYSICS PROPER the Professor treats of the Native or Constitutional Principles which are in the Mind prior to experience. He points out their true Psychological Nature, and shows that they are the fundamental laws or rules of the Faculties. He also specifies the tests, such as Self-evidence, Necessity, and Universality, by which they may be distinguished. He proves that they are in the constitution of the mind, and that they operate spontaneously, but that we can make a reflective or philosophic use of them only after we have detected their nature by a careful induction. He classifies them as the True and the Morally Good. Under the first he treats (1) of Primitive Cognitions and Beliefs, such as Body, Spirit, Substance, Power, Space, Time, the Infinite; and (2) Primitive Judgment, such as Substance and Quality, Mathematical Axioms, Cause and Effect. Under the Good, without entering into the subject of Ethics, he shows that there is a fundamental distinction between Moral Good and Evil. He closes this course by showing how all these principles should conduct us to the belief in a Being who is at one and the same time the True and the Good.

GEOLOGY AND MINERALOGY—*Professor, Wyville Thomson*, LL.D.

The Courses consist of lectures, demonstrations, and examinations. The Geological Course embraces the general principles of the science, and a detailed investigation of the palæontological, lithological, and economic characters of all the formations. The Students are exercised in the practical use of the necessary instruments, and in the construction of Geological maps and working sections. The characteristic fossils of the different formations are rendered familiar by the exhibition of specimens and models, and an excellent series of drawings. Drawings are also used for the illustration of the underground workings of mines of copper, coal, &c.

In the Mineralogical Course the Students are instructed in the most modern crystallography by models, and exercised with the reflecting goniometer. The electro-chemical classification of minerals is then explained, and an extensive suite of minerals in the museum is arranged on that system, for the instruction of the Students.

Once a week examinations are held, and additional explanations given of the subjects of the preceding lectures.

CIVIL ENGINEERING—*Professor, James Thomson*, A.M., C.E.

The Courses of lectures and of practical instruction given by the Professor of Civil Engineering have been modified at the commencement of the present Session, 1860–61, to accord with the new Ordinance of the Queen's University, bearing date the 28th of November, 1859, which prescribes an Engineering Curriculum extending usually over three Sessions* to candidates for the Diploma in Civil Engineering. The Courses being thus in a transition state from the old to the new arrangement, the Second Year Students of the present Session who are

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* The Ordinance leaves it in the power of the College Council to pass Students to the University as qualified candidates for the Diploma after residence for only *two years*, in cases in which their previous acquaintance with a sufficient group of the subjects prescribed for study in the first and second sessions of the ordinary Course shall be deemed by the Council satisfactory.

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proceeding to complete their Curriculum and obtain their Diplomas under the provisions of the old Ordinance receive from the Professor a course of lectures and a course of practice in Drawing, &c., corresponding with the arrangements of previous years.

For the First Year Students under the new arrangement the Professor gives a course of lectures and lessons on Engineering and Architectural Drawing, and on some of the ordinary computations required in Engineers' offices. The instruction in this Course is carried on in a great degree by giving out practical work to the Students, which they perform in presence of the Professor, the requisite information and explanations being given by him, partly before, and partly during the execution of the work. By Lectures, accompanied with oral examinations, are taught the Elements of the Science of Descriptive Geometry, the Principles of Perspective, and other branches of Geometrical Drawing. And in these subjects the Students are exercised in working examples in practice. The Class meets for two hours at a time on two days per week during the three Terms of the College Session.

For the Second Year Students, under the new arrangement, in future Sessions, there will be two Courses conducted by the Professor of Engineering, of which one will be mainly a Lecture Course, and the other a Practice Course. The Lecture Course will comprise mainly the following subjects:—Principles and Practice of Surveying, Levelling, and Plotting, with the theory and use of the Instruments required in Surveying and Levelling Operations; descriptive geometry; perspective; isometrical projection; properties and qualities of materials used in construction; preparation of specifications and estimates; water-works for supplying towns; foundations, cofferdams, bridges, roads, and railways; tunnelling; and an introduction to architecture as a fine art.

In the Practice Course of the Second Year the Students will be engaged in the performance of Office Work and Field Work under the instruction and direction of the Professor; and the business will include surveying, levelling, drawing, mapping, &c.

For the Third Year Students there will be, like as for those for the Second Year, two Courses conducted by the Professor, one a Lecture Course, and the other a Practice Course. The business will comprise the further prosecution of some of the subjects entered on in the Second Year. In the Lecture Course it will include a more advanced treatment of the strength of materials and structures; also the flow of water in orifices, pipes, and canals; drainage of fens by gravitation and by steam power, and other mechanical means; the iron manufacture; processes and mechanisms used in foundries and engineering workshops; ventilation of buildings and mines; farther lectures on railway engineering; and the detailed discussion of various selected undertakings and structures in civil and mechanical engineering.

The Practical Course of the Third Year will include office work, field work, and engineering excursions.

AGRICULTURE—*Professor, John Frederick Hodges,* M.D., F.C.S.

Theory of Agriculture.

The objects of this Course are to teach the principles of Agricultural Science. It includes an account of the origin and composition of soils, the structure and food of plants, and the composition and preparation of manures.

Practice of Agriculture.

The objects of this Course are to teach the young agriculturist how practice may be conducted in accordance with the principles of science, and the results of experience, and to describe the methods by which the largest amount of food may be profitably obtained from the soils of this country. It includes an account of the processes employed in the preparation of the soil for crops, draining, irrigation, &c., the history of the plants of the farm, and the economy of farm produce.

History and Diseases of Farm Animals.

In this Course the history, structure, and treatment of the animals of the farm, in health and disease, are described, and the relative value and economical preparation of the various substances used in feeding explained.

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Digest of Subjects and Courses.

All the Lectures in these Courses require an extensive series of illustrations, and efforts have been made to obtain suitable collections of apparatus, models, &c.; a most valuable collection of drawings has been provided for the demonstration of the structure and forms of animals, and numerous specimens of seeds, &c., have been presented to the College. As the history of the treatment and technical management of the flax plant, which affords the raw material of the staple manufacture of Ireland, is regarded as an important department of the duties of an Agricultural Professor in Ulster, the chief seat of the flax industry, a complete series of flax implements and specimens has been placed in the museum.

The Students are examined frequently during the Session, and required to write abstracts of the lectures. By these means their attention is secured, and their progress ascertained. Excursions are also made to implement and manure manufactories, and they attend the monthly meetings of the Chemico-Agricultural Society of Ulster, which are held in Belfast.

The influence which the young men thus trained must, in future years, exercise on the agriculture of Ireland may be expected to produce the most beneficial results.

ANATOMY AND PHYSIOLOGY—*Professor, Peter Redfern,* M.D., M.R.I.A.

The Department of Anatomy and Physiology comprises the Lectures on Anatomy and Physiology delivered at Queen's College, and the Course of Practical Anatomy and Anatomical Demonstrations carried on in a building hired for the purpose at the distance of a mile from the College.

The Course of Anatomy and Physiology includes about 115 meetings, each of an hour's duration, held on the first five days of each week from November to April inclusive. These meetings are for lecture and occasional examinations on the subjects previously considered in the lectures. The lectures include a complete course of the Anatomy and Physiology of the general textures of the body, including the blood, chyle, &c., and a systematic account of the whole of the viscera, treated of as they are associated in groups for the several purposes of digestion, circulation, respiration, urination, innervation, and generation; also the organs of sense. In treating of every part or organ its healthy state is shown by recent dissections and by preparations from the Museum illustrating it in man and animals, its diseased states and actions being referred to at the same time and contrasted with the healthy ones. The textures not visible to the naked eye are shown under a series of achromatic microscopes, so that during the Course every student in the class has an opportunity of judging for himself of the true characters of each part, and, by becoming familiarized with these, of recognising each when changed by disease.

The Course of Practical Anatomy and Anatomical Demonstrations includes:—

1st. Dissections carried on throughout the day under the immediate superintendence of the Professor of Anatomy and Physiology, and the Demonstrator. Each Student is required to be steadily engaged in dissections during the whole Session. For this purpose the supply of subjects is regular and abundant, and thus affords the surest foundation for efficient medical teaching.

2nd. This Course includes the Anatomical Demonstrations, which consist of a complete Course of Descriptive and Surgical Anatomy, commencing with the anatomy of the skeleton and bones, and including the anatomy of the limbs and other parts, excluding that of the viscera and the physiology treated of in the Course of Anatomy and Physiology. The demonstrations are given on each of the first five days of the week, and are about 115 in number in each Session.

Owing to the want of proper apartments at the College for the purposes of Practical Anatomy and Demonstrations, the Students still suffer great inconvenience by having to pass to and fro between the practical rooms and the College. In the intervals of their classes they also lose much valuable time, which, under other circumstances, might be spent in dissecting. This serious evil impairs the efficiency of the Medical Faculty, and constitutes the chief hindrance to the full development in Belfast of a very large and prosperous Medical School. It is earnestly to be desired that the Government should provide suitable anatomical apartments within the precincts of the College grounds, and thus encourage the cultivation and teaching of Medical Science where so many other circumstances are unusually favourable for these purposes.

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Digest of Subjects and Courses.

PRACTICE OF MEDICINE—*Professor, John Creery Ferguson*, M.A., M.B., *Hon. Fellow of King and Queen's College of Physicians, &c.*

The class meets four times each week, from the first week of November to the last of the following April.

An examination is held usually once a fortnight. The Course embraces the principles of Inflammation, Fevers, the diseases, organic and functional, of the viscera of the three great cavities of the human body. In treating of individual diseases, their pathology, semeiology, ætiology, and treatment, are the subjects chiefly dwelt on. Wherever it is possible, pathology is illustrated by the preparations afforded by our Museum, by drawings and plates, or by recent specimens. It may be added that the Professor's present connexion with the Belfast General Hospital adds greatly to the means of making his Course more useful and interesting to students.

THEORY AND PRACTICE OF SURGERY—*Professor, Alexander Gordon*, M.D.

Four Lectures are delivered weekly during the Medical Session. An examination is held each day on the subject of the preceding day's Lecture. Each Course comprises the following subjects:—

Inflammation,
Suppuration,
Mortification,
Erysipelas,
Burns,
Ulcers,
Wounds,
Hæmorrhage,
Diseases of the Arteries,
,, Veins,
Fractures of Trunk and Extremities,
,, Cranium, Injuries of the Brain and Scalp,
Dislocations,
Diseases of the Joints,

Diseases of the Bursae,
,, Bone, benign and malignant,
,, the Jaws and Mouth,
,, the Fingers and Toes,
,, Female Breast,
,, Anus and Rectum,
,, Testis,
,, Hernia,
,, Prostate,
,, Bladder,
,, Eyes,
,, Larynx,
Syphilis,
Gonorrhœa,
Stricture.

All the capital and minor operations are performed on the dead subject. A Dissecting Room in the College would be highly advantageous to the Surgical Student, as the Professor would be thereby enabled to make the Course of Operative Surgery more extensive, and it would afford additional facilities for instruction in Surgical Anatomy. The Professor delivers a separate Course of twenty-five Lectures on Operative Surgery.

MATERIA MEDICA—*Professor, James Seaton Reid*, M.D.

This Course includes—

1st. General Pharmacology, or the modes in which medicines act upon the living organism in a state of health.

2nd. Therapeutics, or the modes in which medicines act as curative agents.

3rd. Pharmacy.

4th. Dietetics, a review of the different kinds of food used in health and in disease.

5th. Special Pharmacology, or the history, composition, uses, and modes of administering medicinal agents for the cure of disease.

The Class meets four times each week. An examination is held once every week.

MIDWIFERY—*Professor, William Burden*, M.D.

Lectures four times a week during the six winter months consist of following subjects:—

Anatomy of the pelvis, so much as is required for midwifery. Its measurement and pelvimeters.

Contents of the pelvis. The functions of the uterus in its virgin state.

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Conception—length of gestation—changes of the uterus and its appendages during gestation.

Growth of child from its earliest seen form until its full parasitic size.

Graafian vesicle and corpus luteum. Fœtus, its circulation, signs of maturity, weight, and length.

Plural births.

Proportion of births and deaths of males to females.

Superfœtation.

Signs of pregnancy.

Signs of approaching labour.

Natural labour, its progress; also the positions and progress of child till its separation from its mother.

Management of natural labour, including the arrangement of the bed and bed-room, and the proper dress and posture of the patient.

Tedious labour, its causes and treatment.

Labour requiring the use of instruments; their application taught on models in the class.

Cæsarean section and Sequltean operation—how to prevent the fœtus from getting large in uterus.

Premature labour—how to bring it on, and when it is necessary to do so.

Cross-births and their treatment.

Abortion—how to prevent it.

Extra uterine fœtations—how they occur, and their treatment.

Management of women after delivery, and treatment of such accidents and diseases as occur at this period.

Management of children after birth, washing, dressing, food, &c., and the choice of a wet-nurse, and treatment of such accidents as take place at this period, or soon after.

Practical midwifery taught by pupils attending patients in their own houses and in the Lying-in hospital, where Clinical Lectures are given.

MEDICAL JURISPRUDENCE—*Professor, Dr. Hodges.*

The Lectures in this Course are delivered twice weekly during six months. They include an account of the history and chemical investigation of poisons, and of the various subjects respecting which the evidence and assistance of Medical Practitioners may be required in Courts of Law. Experimental illustrations of the methods to be pursued in medico-legal inquiries are given, and frequent examinations held to test the progress of Students. No salary has been allocated to the Teacher of this department, and the duties, at the request of the Council, have, since the opening of the College, been performed by Dr. Hodges.

ENGLISH LAW—*Professor, Echlin Molyneux, Q.C.*

The Professor of English Law, in conducting his department, has constantly kept in view the object of the Select Committee of the House of Commons in recommending the foundation of Chairs in Law in connexion with the Queen's Colleges, which, as they stated in their Report on Legal Education, was not merely to prepare Candidates for the Bar, and for the profession of Attorney and Solicitor, but to raise the standard of legal attainments amongst local practitioners, and especially to provide opportunities of legal education to qualify persons intended to fill administrative situations not strictly legal—a policy which has been since followed up by the Legislature conferring privileges, by way of inducement, on Candidates for the profession of Attorney and Solicitor, who shall avail themselves of these Schools of Law.

The Course of the *First* year in this department comprehends the elements of real and personal property, with the principles of conveyancing; that of the *Second* consists of an introduction to the principles and practice of Courts of Equity and the law of Bankruptcy; the *Third* Course includes the common

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law as incident to contracts, the nature and form of remedies by civil action, and an outline of criminal law, theoretical and administrative, which last completes the Curriculum of instruction required for the attainment of the Diploma of Elementary Law in the Queen's University. The subjects prescribed for Students of the *Fourth* year to qualify them for the Degree of LL.B. embrace a more extended and detailed course of the subjects already enumerated, including the law of wills, powers, evidence, and procedure.

The Lectures are made auxiliary to the cotemporaneous studies directed, and are accompanied by interrogation, independent of the General Examination and that for Honors. Such books, cases, and decisions, and portions of treatises are pointed out for reading as are considered by the Professor most useful in elucidating a branch of learning which is scarcely furnished with books exclusively intended for instruction; and no efforts have been spared to point out the peculiarities of the law in Ireland, whether proceeding from statutes or inherent diversity of practice, or to direct attention to the recent changes which have been introduced into the course of procedure.

From the first opening of the College to the present time the successive classes have spontaneously applied themselves with assiduity and perseverance to the various subjects of legal instruction, and several Non-Matriculated Students have from time to time availed themselves of the privilege afforded by the College Ordinances of attending detached Courses of the Lectures on selected subjects.

Under these circumstances, the Professor is gratified at being able to give the assurance that the Faculty of Law has fully realized the objects of its founders, and that a further extension of its public benefits would ensue upon the adoption by Government of the suggestion made by the same Committee of the House of Commons that a preference should be given to candidates for situations in the Civil Service, not of a purely legal nature, who could produce testimonials of legal attainments from those institutions—a rule which would fully accord with the principle laid down in a recent report of another Committee in relation to the Civil Service.

JURISPRUDENCE AND POLITICAL ECONOMY—*Professor, T. E. Cliffe Leslie*, LL.B.

The subjects embraced in the Course of Lectures on *Jurisprudence* are, according to the regulations of this College, (1) the Elements of Jurisprudence, (2) Civil Law, (3) Constitutional Law, (4) Colonial and International Law.

In the treatment of these subjects both the *Historical* and *Philosophical* Methods are followed in the Lectures of the Professor. The Historical Method, for example, is applied in tracing the principal changes through which the laws of England have passed, the assignable causes of such changes, and the degree and manner in which, in comparison with the laws of Continental Europe, the laws of this kingdom have been affected by contact with the principles of Roman legislation. The method of Philosophical Analysis, on the other hand, is applied in investigating the doctrines of the foundation and classification of rights, the several parts and legitimate form of a complete code, the relation of Scientific Jurisprudence to other departments of Social Philosophy, and the means of improving the state of Positive Law as deducible from such considerations.

The subjects which a Course of Lectures on *Political Economy* must embrace are fewer and more definite than those classed under the less advanced and more complicated Science of Jurisprudence. It is the Professor's endeavour to illustrate the principles of Economic Science by the help of those practical applications which will be most interesting and useful in a large commercial town.

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General Class Examination.

APPENDIX No. 8.

GENERAL CLASS EXAMINATION at the end of the SESSION 1859–60.

FIRST YEAR STUDENTS.

GREEK.—*Examiner, Professor MacDouall.*

I.—1. Translate accurately and perspicuously these lines from the *Ion* of EURIPIDES:

ΧΟΡΟΣ. οἴμοι! κακούργους ἄνδρας ὡς ἀεὶ στυγῶ,
οἳ συντιθέντες[12] τἄδικ'[4] εἶτα[12] μηχαναῖς
κοσμοῦσι! φαῦλον χρηστὸν ἂν[13] λαβεῖν φίλον
θέλοιμι[13] μᾶλλον ἢ κακὸν σοφώτερον.
ΠΑΙΔ. καὶ τῶνδ' ἁπάντων ἔσχατον πείσει[2] κακόν·
ἀμήτορ', ἀναρίθμητον, ἐκ δούλης τινὸς
γυναικὸς εἰς σὸν δῶμα δεσπότην ἄγει.[3]
ἁπλοῦν ἂν ἦν[13] γὰρ τὸ κακόν, εἰ παρ' εὐγενοῦς
μητρὸς, πιθών[4] σε, σὴν λέγων ἀπαιδίαν,
ἐςῴκισ' οἴκους· εἰ δέ σοι τόδ' ἦν πικρόν,
τῶν Αἰόλου νιν[5] χρῆν[6] ὀρεχθῆναι[7] γάμων.
ἐκ τῶνδε δεῖ σε δὴ γυναικεῖόν τι δρᾶν.

* * * * * *

ἐγὼ μὲν οὖν σοι καὶ συνεκπονεῖν θέλω
καὶ συμφονεύειν παῖδ' ἐπειςελθὼν δόμοις
οὗ[8] δαῖθ' ὁπλίζει καὶ τροφεῖα δεσπόταις
ἀποδοὺς[9] θανεῖν[10] τε ζῶν τε φέγγος εἰςορᾶν.
ἓν γάρ τι τοῖς δούλοισιν αἰσχύνην φέρει,
τοὔνομα· τὰ δ' ἄλλα πάντα τῶν ἐλευθέρων
οὐδὲν κακίων δοῦλος, ὅςτις[14] ἐσθλὸς ᾖ.[14]
ΧΟΡΟΣ. κἀγώ, φίλη δέσποινα! συμφορὰν θέλω
κοινουμένη[11] τήνδ' ἢ θανεῖν ἢ ζῆν καλῶς.

2. Parse accurately the words numbered from 1 to 11.

3. Explain clearly the syntax and mutual relations of the words numbered 12, 13, 14.

II.—Translate accurately and perspicuously the annexed extract from the *Cyropaedeia:*

οἱ δ' αὖ πολέμιοι, ὡς εἶδον τοὺς Μήδους προκινηθέντας,[1] διατεινάμενοι[2] οἱ μὲν τὰ παλτὰ οἱ δὲ τὰ τόξα εἱστήκεσαν,[3] ὡς ἂν ἐπειδὴ εἰς τόξευμά γε ἀφίκοιντο στησομένους,[4] ὥςπερ τὰ πλεῖστα εἰώθεσαν[5] ποιεῖν. μέχρι γὰρ τοσούτου, ὁπότε ἐγγύτατα[6] γένοιντο, προςήλαυνον[7] ἀλλήλοις καὶ ἠκροβολίζοντο[8] πολλάκις μέχρι ἑσπέρας. ἐπεὶ δὲ ἑώρων[9] τοὺς μὲν σφετέρους[10] φυγῇ εἰς ἑαυτοὺς φερομένους, τοὺς δ' ἀμφὶ τὸν Κῦρον ἐπ' αὐτοὺς ὁμοῦ φερομένους, τὸν δὲ Ἀστυάγην σὺν τοῖς ἵπποις ἐντὸς γιγνόμενον ἤδη τοξεύματος, ἐκκλίνουσι καὶ φεύγουσιν. οἱ δέ, ἅτε ὁμόθεν διώκοντες,[11] ἀνὰ κράτος ᾕρουν[12] πολλούς· καὶ τοὺς μὲν ἁλισκομένους[13] ἔπαιον καὶ ἵππους καὶ ἄνδρας, τοὺς δὲ πίπτοντας κατέκαινον.[14] καὶ οὐ πρόσθεν ἔστησαν πρὶν ἢ πρὸς τοῖς πεζοῖς τῶν Ἀσσυρίων ἐγένοντο. ἐνταῦθα μέντοι δείσαντες[15] μὴ καὶ ἐνέδρα τις μείζων ὑπείη, ἐπέσχον.[16] ἐκ τούτου δὴ ἀνῆγεν[17] ὁ Ἀστυάγης, μάλα χαίρων καὶ τῇ ἱπποκρατίᾳ καὶ τὸν Κῦρον οὐκ ἔχων ὅ τι χρὴ λέγειν, αἴτιον μὲν ὄντα εἰδὼς[18] τοῦ ἔργου, μαινόμενον[19] δὲ γιγνώσκων τῇ τόλμῃ. καὶ γὰρ τότε ἀπιόντων[20] οἴκαδε μόνος τῶν ἄλλων ἐκεῖνος οὐδὲν ἄλλο ἢ τοὺς πεπτωκότας[21] περιελαύνων ἐθεᾶτο,[22] καὶ μόλις αὐτὸν ἀφελκύσαντες[23] οἱ ἐπὶ τοῦτο ταχθέντες[24] προςήγαγον τῷ Ἀστυάγει, μάλα ἐπίπροςθεν ποιούμενον τοὺς προςάγοντας, ὅτι ἑώρα τὸ πρόςωπον τοῦ πάππου ἠγριωμένον[25] ἐπὶ τῇ θέᾳ[26] τῇ αὐτοῦ.

Or else these lines from the *Ilias:*

Τὸν δ' ἄρ' ὑπόδρα[1] ἰδὼν προςέφη πολύμητις Ὀδυσσεύς·
"Ἀτρείδη! ποῖόν σε ἔπος φύγεν ἕρκος ὀδόντων;

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οὐλόμεν' ![2] αἴθ'[3] ὤφελλες[4] ἀεικελίου[5] στρατοῦ ἄλλου
σημαίνειν μηδ' ἄμμιν[5] ἀνασσέμεν ![6] οἷσιν ἄρα Ζεὺς
ἐκ νεότητος ἔδωκε καὶ ἐς γῆρας τολυπεύειν
ἀργαλέους[7] πολέμους, ὄφρα φθιόμεσθα[8] ἕκαστος.
οὕτω δὴ μέμονας[9] Τρώων πόλιν εὐρυάγυιαν[10]
καλλείψειν,[11] ἧς εἵνεκ' ὀϊζύομεν κακὰ πολλά ;
σίγα, μή τίς τ' ἄλλος Ἀχαιῶν τοῦτον ἀκούσῃ
μῦθον, ὃν οὔ κεν ἀνήρ γε διὰ στόμα πάμπαν ἄγοιτο,
ὅςτις ἐπίσταιτο[12] ᾗσι[13] φρεσὶν ἄρτια βάζειν
σκηπτοῦχός τ' εἴη, καί οἱ[14] πειθοίατο[15] λαοὶ
τοσσοίδ' ὅσσοισιν σὺ μετ' Ἀργείοισιν ἀνάσσεις.
νῦν δέ σευ[16] ὠνοσάμην[17] πάγχυ φρένας, οἷον ἔειπες·
ὃς κέλεαι,[18] πολέμοιο συνεσταότος[19] καὶ ἀϋτῆς,[20]
νῆας ἐϋσσέλμους ἅλαδ'[21] ἑλκέμεν, ὄφρ' ἔτι μᾶλλον
Τρωσὶ μὲν εὐκτὰ[22] γένηται ἐπικρατέουσί[23] περ ἔμπης,[24]
ἡμῖν δ' αἰπὺς ὄλεθρος ἐπιῤῥέπῃ· οὐ γὰρ Ἀχαιοὶ
σχήσουσι πτόλεμον, νηῶν ἅλαδ' ἑλκομενάων,[25]
ἀλλ' ἀποπαπτανέουσιν,[26] ἐρωήσουσι[27] δὲ χάρμης.[28]
ἔνθα κε σὴ βουλὴ δηλήσεται,[29] ὄρχαμε[30] λαῶν !"

III.—Parse fully all the words numbered in either extract, giving derivations where not quite obvious.

[*Passages were also set for translation from Latin both in Attic Prose and in Trimeter Iambics.*]

LATIN.—*Examiner, Rev. Dr. Reichel.*

[*The Latin Examination was chiefly oral.*]

ENGLISH LANGUAGE.—*Examiner, Professor Craik.*

1. Enumerate in the order of time the successive languages that appear to have established themselves in South Britain from the earliest date down to the Norman Conquest; stating briefly what is known in regard to the introduction of each, and the extent to which they severally prevailed.

2. Explain from what range of country on the opposite continent all the recorded invasions of South Britain appear to have proceeded, and from what points in that range they successively proceeded, with the circumstances which determined the movement of the invading spirit northwards or southwards.

3. Give the common account, as preserved by Beda and other early writers, of the parts of the opposite continent in which the several populations had been previously seated who effected settlements in South Britain after the breaking up of the Western Empire, and of the portions of their new country which they respectively occupied.

4. Give a distinct account of what is called the Indo-European Family of Languages.

5. Give a distinct account of the Gothic branch of the Indo-European Family of Languages.

6. Explain the origin of the French tongue, and its position in the Indo-European Family, with the terms French, Francic, Langue d'Oyl, Langue d'Oc (Occitanian), Provençal, Romance, Neo-Latin.

7. Explain distinctly the only two great Revolutions which the English language is known to have undergone, and compare and discriminate the three forms or stages into which its history is thereby divided.

8. Explain the import of the terms Saxon, Semi-Saxon, Early English, Middle English, and Modern English, as commonly used and understood.

9. Give a short account of the Brut of Layamon, the Ormulum, and the Chronicles of Robert of Gloucester and Robert de Brunne.

10. Explain what functions the final *e* appears to perform in the English of the time of Chaucer, in such forms as name, wode, shoures sote, to the rote, hire gretest othe, that brighte shone.

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11. Explain what is meant by the Latin of the First Period and the Latin of the Second Period in our existing English, giving examples of each.

12. Explain what philologists understand by a Synthetic as opposed to an Analytic language, and by a Strong verb as opposed to a Weak verb.

MODERN LANGUAGES.—*Examiner, Dr Frings.*

FRENCH.

Un jour que je suivais l'une des rues les plus longues de Paris, je fus frappé de l'activité d'un petit homme qui portait une hotte sur son dos et une grande poche en place de tablier. Il s'arrêtait à chaque borne, à chaque coin de rue, portait un bâton terminé par un crochet de fer, et jetait avec adresse et dextérité dans sa hotte ou dans sa poche différentes choses que je ne distinguai pas d'abord. Je ne comprenais rien à son travail; mais à force de le suivre, je vis qu'il ramassait des os, du cuir, du papier, des chiffons, du verre cassé, des cendres, des morceaux de porcelaine dorée, de petite ferraille, &c. Poussé de plus en plus par la curiosité, je m'attachai à ses pas; je le vis causer avec un confrère et lui faire part de ses trouvailles, et enfin je finis par lier conversation avec lui. Il vit que je ne me moquais pas de son métier et que j'étais loin de le mépriser lui-même, puisque je lui proposai de boire bouteille ensemble. Il accepta à condition toutefois que j'irais goûter son vin chez lui dimanche matin, ce que je promis sans façon. Alors mon homme posa sa hotte et sa poche, se lava les mains à la pompe et me suivit dans la chambre d'un petit cabaret voisin.

Je vois bien, Monsieur, me dit-il, que vous êtes étranger et que mon petit commerce vous étonne. Je gagerais même que vous vous êtes déjà demandé comment je pouvais y gagner ma vie. Je m'en vais vous le raconter.

GERMAN.

Nemea war ein Thal mit einem dichten Walde zwiſchen hohen Bergen, im Lande des Euryſtheus: in dem Walde wohnte ein ſehr böſer Löwe, deſſen Fell war ſo ſtark, daß kein Eiſen ihn verwunden konnte, und wenn die Hirten Spieße auf ihn warfen, ſo fielen ſie nieder, ohne dem Löwen Schaden zu thun, und der Löwe ſprang auf ſie und zerriß ſie. Hercules ſtellte ſich im Walde, wie die Jäger es thun, hinter die Bäume, daß ihn das Raubthier nicht ſähe, wenn er ſchießen wollte. Da kam der Löwe durch den Wald: er hatte eben Kinder gefreſſen, und ſein Maul und ſeine Mähne waren noch ganz blutig; er leckte ſich mit ſeiner großen Zunge das Blut, welches ihm am Maul ſaß, und brüllte dermaßen daß die Erde zitterte. Mit ſeinem Schwanz ſchlug er ſich die Seiten und die Bäume. Hercules ſchoß, aber der Pfeil ſprang ab. Er ſchoß noch einmal, der Pfeil aber konnte nicht durch die Haut des Löwen dringen, weil ſie ſo dick war. Hercules wickelte nun ſeinen Mantel um den linken Arm, um den Löwen abzuhalten, der im Begriff war auf ihn loßzuſpringen, und in die rechte Hand eine große Keule nehmend, die er ſich im Walde gehauen hatte, ſchlug er damit den Löwen auf den Kopf. Als das Thier todt war, zog ihm Hercules das Fell ab, und hing es ſich um.

Translate into French or German:—

In this year we may expect the planets to be movable; but they will move only in the courses appointed by the Creator. From certain aspects, we may conclude that the colic and other signs of a disordered stomach will be prevalent in the summer among the people who eat large quantities of unripe fruit, especially plums, and drink plenty of sour buttermilk. Corn will be too dear for poor men, and too cheap for great landowners. Vines will not flourish in Scotland and Ireland; but the best vineyards on the Rhine will produce wine strong enough to throw many people down from chairs and stools. Beer, also, will be good this year, if the brewers will not use too much water. In short, we may expect an abundant supply of wine and corn, if the wishes of the poor people are fulfilled. Dairymen may take notice that black cows will give white milk. With regard to the affairs of various nations, we may venture to say that the Italians and the French will prosper, if nothing occur to prevent it. Also we may promise that there will be corn in Poland, many cows in Switzerland, fine oxen in Hungary, good butter and cheese in Holland and Flanders, salt fish in Norway, fresh salmon in Scotland, and a plentiful supply of ignorance and folly in all countries.

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General Class Examination.

MATHEMATICS.—*Examiner, Professor Tait.*

ALGEBRA.

1. Is it *asserted* or *proved* that $ab=ba$? Supposing it to be true, show that for any number of factors the product is independent of the order.

2. Give the rule for the sign of the product of two or more factors. How is its truth established? Is the following an exception? $\sqrt{a}\sqrt{b}=\sqrt{ab}$ but

$$\sqrt{-1}\,\sqrt{-1}=-1.$$

3. In what sense is $\frac{1}{1-x}=1+x+x^2+\ldots\ldots$? Correct the expression by the introduction of a remainder after $\overline{n+1}$ terms. Point out from the value of this remainder the cases in which the series can be taken as an *arithmetical* equivalent to the fraction.

4. Extract the square root of

$$x^4+\frac{25}{4}+14x^2-3x^2(2x+5).$$

and decompose $\frac{x^2-5x+3}{(x+1)(x+2)(x+3)}$ and $\frac{1}{x^4-1}$ into partial fractions.

5. Solve the equations

$$\alpha)\qquad \frac{x}{3}-\frac{x}{7}=\frac{x}{5}-1,$$

$$\beta)\qquad \frac{x^2-3x+1}{x+2}=\frac{x^2+5x-12}{x+1},\text{ and}$$

$$\gamma)\qquad \left.\begin{array}{l}31x+29y+30z=32\\ 19x+20y+21z=18\\ 6x+7y+5z=8\end{array}\right\}$$

Solve the set (γ) by determinants, and prove the principal elementary properties of those of the third order.

6. *A's* and *B's* watches have each an uniform rate. At 12 o'clock *A's* watch is right, and *B's* is half an hour fast. When *B's* shows *5h.* *A's* shows *5h. 2m.* and at *9h.* one is twice as far wrong as the other. Find the rates of the watches.

7. Find the first 5 convergents to the square root of 5. Employ a property of continued fractions to find one solution in positive integers of $17x-15y=3$.

8. Extract the square root of 303203244 in the scale of 5; and divide 63 by 9, putting each previously into the scale of 2.

9. Show that the number of permutations of n things r together is expressed by the product of r descending factors beginning with n. If this be called P^n_r show that

$$P^n_r+rP^n_{r-1}=P^{n+1}_r.$$

10. For two independent events whose probabilities are p and p', find the chance of 1st, only one happening; 2nd, not more than one failing; 3rd, one at least happening.

11. Define the logarithm of a given number to a given base. Assuming that $a^x=1+Ax+\frac{A^2x^2}{1.2}+\&c.$, where $A=\overline{a-1}-\frac{\overline{a-1}^2}{2}+\frac{\overline{a-1}^3}{3}-\&c.$, and that if $a=\varepsilon$ then $A=1$, prove that $\log._{\varepsilon}(1+x)=x-\frac{x^2}{2}+\frac{x^3}{3}-\&c.$, and find a formula for $\log._{10}\frac{m}{n}$ in terms of the fraction $\frac{m-n}{m+n}$.

TRIGONOMETRY, &c.

1. Similar triangles are to each other in the duplicate ratio of homologous sides.

2. If two tangents be drawn to a parabola from an external point, they subtend equal angles at the focus.

3. Explain carefully the two principal methods of measuring angles, and calculate the circular measure of 14° 5′ 27″ and the degrees, minutes, and seconds in 0·759.

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General Class Examination.

4. Define the sine and cosine of an angle as ratios in a right-angled triangle, and apply the definition to the proof of the two fundamental relations between the sides and angles of all triangles.

5. Define the tangent and secant of an angle as lines in the unit circle. Explain how the sign of the latter can be ascertained. Show geometrically that $\tan(\alpha+\theta)-\tan\alpha=\theta\ \sec^2\alpha$ (nearly) when θ is very small. Why is θ in this expression necessarily in circular measure?

6. Prove the same proposition analytically. On what does the assumption rest that $\frac{\sin\theta}{\theta}$ and $\frac{\cos\theta}{1}$ become (when θ is small enough) nearer to unity than any assignable quantity?

7. Explain the method of proportional parts, and, with the following data, find the values of log. 12 87646; L cos. 49° 13′ 45″ 7, and the number and angle corresponding to the log. $\bar{1}\cdot1097983$, and the tabular log. cos, 9·8150000.

$$\left.\begin{array}{r}\text{log. } 12876=4\cdot1097810,\\ \text{D for } 1=337.\end{array}\right\}\ \left\{\begin{array}{r}\text{L cos. } 49^\circ\ 13'=9\cdot8150464,\\ \text{D for } 1'=1465.\end{array}\right.$$

8. On what does the method of proportional parts depend? Prove its truth for L sin θ and point out the values of θ for which it is not applicable.

9. Prove the following: α) Sin $(A+B)=\sin A\cos B+\cos A\sin B$, first when A and B each $>0^\circ<90^\circ$ and $A+B<90^\circ$, second when $A>180^\circ<270^\circ$, $B>90^\circ<180^\circ$, $A+B>270^\circ<360^\circ$. β) If $A+B+C=180^\circ$, $\sin A+\sin C-\sin B=4\sin\frac{A}{2}\sin\frac{C}{2}\cos\frac{B}{2}$.

10. Enunciate and prove Demoivre's theorem, and by it find the roots of $x^5-1=0$.

11. Enumerate the steps of the demonstration of the formulæ for the expansion of $\sin\alpha$ and $\cos\alpha$ in powers of α. Which step necessitates α's being the circular measure of the angle? Within what limits are these formulæ true? Write down the series for $\cos(\pi+1)$.

12. Calculate the angles at the base of a triangle whose sides are 37 and 13, and vertical angle 27° 12′, with the following data:—

$$\left.\begin{array}{r}\text{log.}2=\cdot301030,\\ \text{log.}3=\cdot477121,\end{array}\right\}\ \text{L tan}13^\circ\ 36'=9\cdot3836816.$$

$$\left\{\begin{array}{r}\text{L tan}63^\circ\ 15'=10\cdot2975337,\\ \text{D for } 1'=3144.\end{array}\right.$$

SECOND YEAR STUDENTS.

GREEK.—*Examiner, Professor MacDouall.*

I. Translate accurately and perspicuously the following extract from the *Seven against Thebes* of ÆSCHYLUS:

ΑΓΓΕΛΟΣ. Καπανεὺς δ᾽ ἐπ᾽ Ἠλέκτραισιν εἴληχεν[1] πύλαις,
γίγας ὅδ᾽ ἄλλος τοῦ πάρος λελεγμένου
μείζων· ὁ κόμπος δ᾽ οὐ κατ᾽ ἄνθρωπον φρονεῖ,
πύργοις δ᾽ ἀπειλεῖ δείν᾽, ἃ μὴ κραίνοι[2] Τύχη!
θεοῦ τε γὰρ θέλοντος ἐκπέρσειν πόλιν
καὶ μὴ θέλοντός φησιν, οὐδὲ τὴν Διὸς
Ἔριν πέδῳ σκήψασαν ἐκποδὼν σχεθεῖν.[3]
τὰς δ᾽ ἀστραπάς τε καὶ κεραυνίους βολὰς
μεσημβρινοῖσι[10] θάλπεσιν προςῄκασεν.[4]
ἔχει δὲ σῆμα γυμνὸν ἄνδρα πυρφόρον,
φλέγει δὲ λαμπὰς διὰ χερῶν ὡπλισμένη·
χρυσοῖς[5] δὲ φωνεῖ γράμμασιν, πρήσω πόλιν.
τοιῷδε φωτὶ[6] δ᾽, εἰπέ, τις ξυστήσεται;[7]
τίς ἄνδρα κομπάζοντα μὴ τρέσας[8] μενεῖ;

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ΕΤΕΟΚΛΗΣ. κἂν τῷδε κέρδει κέρδος ἄλλο τίκτεται.
τῶν τοι ματαίων ἀνδράσιν[11] φρονημάτων
ἡ γλῶσσ' ἀληθὴς γίγνεται κατήγορος.[12]
Καπανεύς γ' ἀπειλεῖ δρᾶν παρεσκευασμένος
ἅ,—θεοὺς ἀτίζων[13] κἀπογυμνάζων στόμα
χαρᾷ ματαίᾳ,—θνητὸς ὢν ἐς οὐρανὸν
πέμπει γεγωνὰ[14] Ζηνὶ κυμαίνοντ'[15] ἔπη.
πέποιθα[6] δ' αὐτῷ ξὺν δίκῃ τὸν πυρφόρον
ἥξειν κεραυνὸν οὐδὲν ἐξῃκασμένον
μεσημβρινοῖσι θάλπεσιν τοῖς ἡλίου.
ἀνὴρ δ' ἐπ' αὐτῷ, κεὶ στόμαργός[16] ἐστ' ἄγαν,
αἴθων[17] τέτακται λῆμα,[18] Πολυφόντου βία,
φερέγγυον[19] φρούρημα,[20] προστατηρίας[21]
'Αρτέμιδος εὐνοίαισι σύν τ' ἄλλοις θεοῖς.

1—9. Parse fully the words thus numbered.

10—21. Derive or decompound the words thus numbered.

22 Substitute for any peculiar expressions synonymous or analogous phrases, discriminating poetic from prosaic usage, and Homeric from Attic.

23. *a.* Cite from the *Phoenissae* of Euripides passages parallel to some parts of the extract.

b. Translate and explain the construction of—

καὶ τοσόνδ' ἐκόμπασε,
μηδ' ἂν τὸ σεμνὸν πῦρ νιν εἰργάθειν Διὸς
τὸ μὴ οὐ κατ' ἄκρων περγάμων ἑλεῖν πόλιν.

c. Punctuate and translate—

δεξιᾷ δὲ λαμπάδα
Τιτὰν Προμηθεὺς ἔφερεν ὡς πρήσων πόλιν.

24. Notice and comment upon such various readings as you may remember.

II. Translate in Attic prose the following remarks of GOLDSMITH:—

In human institutions a smaller evil is allowed, to procure a greater good: as, in politics, a province may be given away to secure a kingdom; and, in medicine, a limb may be lopt off to preserve the body. But, in religion, the law is written and inflexible—*never* to do evil. Otherwise, if we commit a smaller evil to procure a greater good, certain evil would be incurred in expectation of contingent advantage. And, though the advantage should certainly follow, yet the interval between commission and advantage, which is allowed to be guilty, may be that in which we are called away to answer for the things we have done, and the volume of human action is closed for ever.

[*Other Papers not reprinted.*]

LATIN.—*Examiner, Rev. Dr. Reichel.*

[*The Latin Examination was chiefly oral.*]

MATHEMATICS.—*Examiner, Professor Tait.*

Co-ordinate Geometry.

1. In the parabola $QV^2=4SP.PV$.

2. Show that the general equation of the first degree in two dimensions represents a straight line. Assign the co-ordinates of points through which $3x-2y=1$ passes, and show that among them there is an infinite number whose co-ordinates are integers.

3. Find the equation to the straight line which includes with the axes an area $=a^2$, and has a perpendicular from the origin $=b$. How many such are there?

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4. Find the equation to, and the length of, the perpendiculars from (1,2) upon $x-3y=5$. What is the area of the triangle which has this perpendicular for its base, and its vertex the origin?

5. Show from the form of the equation to a circle that it can in general be made to pass through three points only. Through how many can a parabola be drawn?

6. Find the equation to the tangent to a circle, and thence that to the chord of contact of tangents from an external point, showing that if in the latter line any point external to the circle be taken, *its* chord of contact passes through the first point.

7. What are the steps of the reduction of the general equation of the second degree? Show that the term in xy can *always* be removed. Assuming the existence of conjugate diameters, and that the ellipse is a closed curve of the second degree, find the equation to the latter referred to conjugate diameters.

8. Form from the focus and directrix property the polar equation to an ellipse about the focus, and show that $\frac{d^2}{d\theta^2}\frac{1}{r}+\frac{1}{r}$ is invariable.

9. If tangents be drawn to an hyperbola from a point in the directrix, the chord of contact passes through the focus, and a line from the point to the focus is perpendicular to the chord.

10. Find the sectorial area included between two focal radii vectors of a parabola.

11. Trace the curves whose equations are

α) $r=a(1+2\cos\theta)$

β) $xy^2=(a-x)(2a-x)(x+a)$

γ) $x^4-3x^2y+y^3=0.$

and find the whole area of (α).

Differential Calculus, &c.

1. Differentiate $(1-x^{\frac{2}{3}})^{-\frac{3}{2}}$, $\sqrt{\frac{x^2}{\varepsilon}}$, $\sqrt{\frac{x}{1-x}}$, and log cot $\frac{\varepsilon x-1}{\varepsilon x+1}$.

2. Assuming Maclaurin's theorem, develop $\sin x$, ε^x, and $\tan^{-1}(1+x)$ in ascending powers of x, exhibiting in the first two cases the remainder after n terms, and thence showing that the series obtained are convergent.

3. Draw through a given point between rectangular axes a line which shall α) cut off the least triangle, β) form the triangle of least perimeter.

4. What is meant by $\frac{d^2u}{dxdy}$? Show that generally the *order* of differentiations is indifferent.

5. One leg of a rectangular ruler passes through a fixed point, and the right angle moves on a straight line. What is the envelope of the other leg. Solve the same question if a circle be substituted for the line.

6. Integrate the differential coefficients, $x^3(1-x)^5$, $\frac{1}{1-x^3}$ and $\frac{1}{a+b\cos x}$, and evaluate $\int_0^{\infty}\frac{dx}{(1+x^2)_8}$.

7. Integrate the differential equations

α) $\overline{x+y}\,dy-x\,dx=0,$

β) $\frac{dy}{dx}+2xy=3x^2+2x^4,$

γ) $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6y=0.$

δ) $\frac{d^2y}{dx^2}+9y=a\cos 9x+b\cos(5x+1)+c\varepsilon^{-3x}.$

8. Form the equations to the sides and plane of the triangle whose angular points are (1, 0, 0), (3, 1, 0), and (2, 3, 4). Find also the volume of the pyramid of which this is the base, and (1, 1, 1) the vertex.

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9. Explain the general process of reduction of the equation of the second degree in three dimensions, and enumerate the various surfaces it may represent.

10. Find the locus of the foot of the perpendicular from the origin upon the tangent plane to $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.

11. There are two sovereigns and a half sovereign in a bag, *A* and *B* are each to draw till he gets a sovereign—then the other—what should *A* give to *B* for the privilege of drawing first? Answer the question supposing the bag to contain three sovereigns and a shilling.

12. Enunciate and prove Newton's Second and Seventh Lemmas, and employ the former to find the area of a parabola.

13. Find a property of the chord of minimum length which cuts off a given area from any curve of continued curvature.

Logic.—*Examiner, Rev. Dr. M'Cosh.*

1. Wherein does Logic differ from Psychology? How far is it dependent on Psychology? Who drew the distinction between Universal and Particular Logic? State and illustrate the distinction.

2. Define an abstract and a general notion. What sort of reality is there in the abstract and general notion? Name some eminent realists. What oversights have nominalists and conceptualists been guilty of?

3. Explain the nature of the general concrete notion. Show how such a notion admits of higher generalization and of division. How can such a notion be defined? In answering this last question, bring out the nature of logical definition.

4. Define the logical process of judgment. Define a categorical proposition and a hypothetical proposition. "It is an unwarrantable assertion." Bring out the subject copula and predicate of this proposition. Say what is its quality and quantity, and whether the predicate is or is not distributed. Convert it, and try to put it in the various forms of opposition.

5. "Theft is a crime; theft was encouraged by the laws of Sparta: therefore the laws of Sparta encouraged crime." Put this in proper form and bring out the legitimate conclusion. Indicate the mood and figure, give the special rules of that figure and reduce it.

6. "If this man made such a statement, he must be either a fool or a knave, and so he is not to be attended to." Put this in the form of a dilemma. Explain the nature of a dilemma, and say what sort of dilemma it is.

7. Bolingbroke in arguing against the truth of Christianity, shows that there have been religious wars among professing Christians. What is the fallacy involved? In answering this question, sketch the division and subdivision of fallacies, and define precisely that kind of fallacy to which you refer the reasoning of Bolingbroke. Edmund Burke answered Bolingbroke by showing that civil government had bred contentions. How would you state Burke's reasoning as opposed to Bolingbroke's?

8. Are we at liberty to appeal to intuition as we please, and when we please? Under what conditions are we allowed to appeal to intuition? State precisely what is the nature of, and what the difference between, *a priori* and *a posteriori* investigation, and what the nature of necessary and contingent truth.

9. As an example of demonstration, show how the conclusion in the second figure must be negative.

10. What is meant by an "induction by simple enumeration without a known exception?" How was Bacon justified in representing this kind of induction as puerile and useless? Wherein does the method recommended by Bacon differ from it?

11. How is it proven that all crows are black? Is this a law of nature? Is it an empirical law? Wherein does it differ from such a law as that all fish are cold-blooded?

12. Whence arises the difficulty of discovering causes in natural phenomena? Of what special advantage is experiment in enabling us to detect causes? Which

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of the methods of induction is more especially the method that requires experiment? Enunciate the canon of that method.

13. Augustine traces the respect for the goose on the part of the Romans to their gratitude for the safety of the capitol, when the vigilance of the geese in the temple of Juno defeated the attack of the Gauls. According to what canon must this inference be drawn? But what must we suppose before we can draw the inference? which is disputed by some; can you guess on what grounds?

14. How does deduction differ from induction? What must be reached before deduction is allowable in physical science? How does deduction verify induction? An anatomist finds one wing of a bird and can tell you what the other must have been. Is there reasoning here? If so, state it in syllogistic form.

For mere *pass*, the student may substitute any of the following for a corresponding number of the above:—

a. What is the rule as to the distribution of the predicate of a proposition?

b. What is meant by the opposition of propositions? Put the following in the various forms of opposition, "Men are liars." What is meant by contradictory opposition?

c. Indicate the mood and figure of the following, and reduce it:—

No reptile is warm-blooded,
The rat is warm-blooded.
The rat is not a reptile.

d. What is the end aimed at in induction?

e. Define *petitio principii*, and say to what head of fallacies it belongs.

CHEMISTRY.—*Examiner, Dr. Andrews.*

1. State fully what are the laws according to which gaseous bodies expand on the application of heat.

2. What are the principal sources of error in a mercurial thermometer, and how may they be corrected?

3. The latent heat of water being 142°, if a quantity of it be cooled to 19° F., and then agitated so as to make it partially freeze, what portion of the water will become instantly solidified?

4. What is the source of cold in the evaporation of liquid bodies, and how may its amount be calculated?

5. Give an account of Wells' theory of dew, and apply it to explain the formation of ice in countries where the temperature of the air never falls to the freezing point.

6. How does frost act in disintegrating soils and causing the disruption of rocks?

7. State precisely how the thermo-multiplier is applied to determine the amount of heat from different sources, transmitted by plates of rock-salt, glass, alum, &c.

8. State in general terms the theory of volumes, and illustrate it by mentioning the composition by volume of the following bodies: HO, NO, NO_2, NH_3, HCl.

9. How is the pyrogallic acid applied to the analysis of atmospheric air?

10. Give an account of the methods by which a large number of gases have been obtained in the liquid state.

11. State in symbols the reactions when sulphuretted hydrogen is prepared from ShS_3, and from FeS; also, when a solution of a salt of the oxide of lead is precipitated by the same re-agent.

12. When chlorine gas is passed through a solution of caustic potash, hypochlorite of potash or chlorite of potash is formed, according to the conditions of the experiment; explain in symbols the reaction in both cases.

13. Give a short account of the allotropic states of carbon, boron, and silicon.

14. How is magnesium prepared, and what are its chief properties?

15. How is malleable iron converted into steel, and what is the theory of the process?

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General Class Examination.

16. What are the tests of the salts of the protoxide of iron?

17. Give a short account of the method of conducting an organic analysis.

18. Describe the chemical changes which occur during the alcoholic fermentation.

19. What relation exists in the composition of homologous bodies of the methyl, ethyl, propyl, &c., series? State also how their boiling points are related.

20. The composition of conia is $C_{16}H_{15}N$; how may this formula be written on the hypothesis that conia is a substitution ammonia?

21. Describe the theory of the electrophorus, and the method of obtaining a spark from it.

22. How is a permanent charge given by induction to a gold-leaf electroscope? State also how you can determine whether the charge is positive or negative.

23. Describe the construction and theory of Daniell's battery.

24. How is the voltaic current applied to exploding simultaneously a number of separate mines of gunpowder?

25. Explain the construction and theory of Ruhmkorff's induction apparatus.

NATURAL HISTORY.—*Examiner, Dr. Dickie.*

ZOOLOGY.

1. Explain the sense in which the term Homology is used, and illustrate by examples.

2. Describe the structures which enter into the formation of the teeth in Mammals.

3. State the orders comprehended under Lyencephala, and give their characters.

4. Describe the general arrangements in the skeleton of Aves.

5. State the peculiar modifications of the Reptilian type, as observed in Ophidia.

6. Describe the general characters and modifications of the Articulate type, as they occur in Arachnida.

7. Describe the different modes of locomotion in Mollusca.

8. Describe the general modifications of form and structure in the shells of Mollusca.

BOTANY.

1. State the structure of the ordinary vegetable cell, and the influence of certain chemical re-agents upon it.

2. Describe the general structure of the bark of Exogens.

3. Why are certain organs called Phyllodia? State their characters and their true nature.

4. Describe the relations of the parts in a flower of the quinary type, and also their position in relation to a subtending bractea.

5. Describe the structure of Legume, Lomentum, and Siliqua.

6. Describe the development and general structure of Pollen.

7. State the ordinary functions of the root.

8. Why are certain plants called Thalamifloræ? Mention at least four examples of such among native species examined this session.

9. Name, describe, and refer to their position in the natural system the accompanying plants.

THIRD YEAR STUDENTS.

NATURAL PHILOSOPHY.—*Examiner, Dr. Stevelly.*

1. Explain, on Mechanical Principles, why a blow of a sledge hammer, which, if struck directly on a man's breast, would shatter the bone to atoms, may, with impunity, be struck on a massive anvil placed on his breast.

2. State clearly the relations which connect the resultant of two forces, simultaneously applied to a point of a body, with these forces, its components; and give any of the proofs of the truth of your assertion which you know.

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General Class Examination.

3. Explain what prevents a canal boat from running in on the bank on which the horse draws the track rope, and explain the importance of having that rope as long as possible.

4. Explain why a cart loaded with hay will be upset on the same uneven road over which one carrying the same weight of iron would pass safely.

5. Explain the distinction between the statical and dynamical questions to be discussed in treating of the Mechanic Powers or other machines. Enumerate the Mechanic Powers.

6. Explain how friction becomes a practical advantage in the use of the wedge, and in some uses of the screw.

7. Explain how Atwood's machine is used to prove, experimentally, the law by which the space described by a heavy body falling freely under the influence of a uniform accelerating force, is related to the time of its descent. State that law clearly.

8. Enumerate as many of the methods of determining the specific gravity of a fluid as you are acquainted with, and explain clearly and fully any one of them.

9. Explain the principal causes of those disturbances of the atmosphere which we call winds, gales, squalls, and storms.

10. Explain why the barometer falls as you carry it up a mountain.

11. Explain what is meant by an optical image of an object, and show how a plane mirror produces an image.

12. Explain how the prism disperses the several coloured lights, of which the sun's or any other compound light is composed.

13. State the distinction between a "sidereal day," a "mean solar day," and an "apparent solar day."

14. State the law which governs the attractions and repulsions of electrified bodies.

15. Explain what is meant by the "declination," the "variation," and the "dip," of the magnetic needle.

NATURAL PHILOSOPHY (FOR HONOR MEN).

1. If two statical forces, f and f', act on the same point of a body at the same instant, their directions making the angle α, prove that their resultant will be given by the formula.

$$R^2 = f^2 + f'^2 + 2f.f' \cos\alpha.$$

2. Show that the moments of two forces, with respect to any point in the line of direction of their resultant, are equal and opposite.

3. Deduce the resultant of two couples which act on the same body, but not in the same or parallel planes.

4. State and prove the formula, which gives the stability of a heavy body placed on a base or a horizontal plane.

5. Find the centre of oscillation of a uniform heavy cylinder, whose radius $= r$, and length $= z$, suspended by a point of its axis at the distance d, from its centre of gravity.

6. Two spheres, the weight of each of which is w, are suspended by a slender bar with equal arms, by a wire; show how the principle of the cycloidal pendulum is applied to find the force of torsion of the wire.

7. Show that the accelerating force which bends the motion of a body into the circle at the centre of which it constantly acts, is given by the formula $f = \frac{v^2}{r}$: r being the radius of the circle, and v the velocity with which the body moves in its circumference.

8. Find the direction and magnitude of the velocity of projection with which alone a body can be made to move round the circumference of a given circle, to whose centre the force is constantly directed.

9. Explain how you take the specific gravity of a body which is not heavy enough to sink in standard water; also of Mercury.

10. Explain how the velocity of efflux of a heavy fluid, from an orifice in the side or bottom of the containing vessel, can be obtained by experiment.

11. Write down the formula which gives the relation between the elastic force, density, and temperature of a gas or air. Explain its symbols, and give an outline of its proof.

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General Class Examination.

12. Explain the principal causes of those disturbances of the atmosphere which we call winds, gales, squalls, and storms.

13. Let D be the distance of a radiant point from the surface of a concave spherical speculum whose radius is r, and D' the distance of its conjugate geometric focus from the same surface, show that $\frac{1}{D}+\frac{1}{D'}=\frac{2}{r}$; from thence deduce the focal length of the speculum, and show that the distances of the radiant and conjugate from the centre of the speculum are proportional to their distances from the surface.

14. Show that a prism cannot transmit a ray of light when its refracting angle is equal to, or greater than, twice the limiting angle of total reflexion for that kind of light.

15. Explain how the prism disperses the several coloured lights of which the sun's or any other compound light is composed.

16. State the law which governs the attractions and repulsions of electrified bodies.

17. Explain what is meant by the "declination," the "variation," and the "dip," of the magnetic needle.

History and English Literature.—*Examiner, Professor Craik.*

Special Prize Examination.

English Literature.

1. Explain and appreciate the successive accessions which the main stream of the English Language appears to have received from its introduction into Britain down to the present day, taking them, of course, in chronological order.

2. State the principal facts that are known regarding the Language and Literature of the Angles (or Northern English) as distinguished from the Southern English (or Saxons specially so called).

3. Explain the names Anglian, English, Saxon, Anglo-Saxon, Old Saxon, Continental Saxon; noting in how far they are severally legitimate, or in any respect objectionable.

4. Sketch rapidly the course of English Poetry from Chaucer to our own day, confining yourself to the leading names, and indicating the succession of schools or styles, and characterizing each, rather than seeking to enumerate the works of particular writers.

5. Give an account of the life and works of *any one* of the following writers:—Milton, Dryden, Pope, Swift, Burke, Johnson, Cowper, Burns.

6. Write a critical estimate, *from your own knowledge and feeling*, of some one English work with which you are acquainted, belonging to either the 17th or the 18th century.

History.

1. Propose and explain what would be at once the simplest and most perfect method of reckoning the lapse of time.

2. Sketch the succession of what are commonly called the Four Monarchies.

3. Give an account of the succession to the royalty of the Franks and to the Empire from Pepin to Charles the Fat inclusive.

4. Explain the claim of Edward III. of England to succeed to the crown of France in preference to Philip of Valois.

5. Enumerate the several instances in which the principle of Hereditary Right has been violated in the succession to the English crown from the Norman Conquest.

6. Sketch the course of leading events throughout the reign of Elizabeth.

7. Explain the peculiar circumstances in which the law affecting the succession to the crown stood on the death of Queen Elizabeth.

8. Give an account of one or more of the following personages:—Lambert Simnel, Perkin Warbeck, the Protector Somerset, the Lord Admiral Seymour, Dudley Duke of Northumberland, Dudley Earl of Leicester.

9. Give an account of one or more of the following events:—The Battle of the Spurs, the Battle of Flodden, the meeting on the Field of the Cloth of Gold, Kett's Insurrection, the Defeat of the Spanish Armada, the Outbreak of Essex.

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General Class Examination.

PHYSICAL GEOGRAPHY.—*Examiner, Dr. Dickie.*

1. Give a concise comparison of the physical characters of the Northern and Southern Hemispheres.

2. State the general position in latitude and longitude of the highest mountain ranges in Asia, Europe, and America.

3. Explain the climatic influence of land and water surface respectively; and give examples.

4. Explain the cause of decrease of temperature, with increase of height above the sea level.

5. State the causes which give rise to constant ocean currents.

6. State the opinions entertained regarding the original diffusion of animals and plants.

7. Give the general distribution of Quadrumana and Marsupialia,

8. State any particular features in the Fauna and Flora of Ireland.

METAPHYSICS.—*Examiner, Dr. M'Cosh.*

1. Give an account of the nature and function of the automatic or reflex nervous system, of the sensori-motor system, and of the organic apparatus of the muscular sense. What knowledge do the muscular sense and locomotive energy supply?

2. What distinctions must the natural realist draw in order to defend his system? Take up one of these distinctions and illustrate it.

3. Give an analytic account of the knowledge got by sense-perception. What are the intuitive convictions involved in sense-perception?

4. Give an analytic account of the knowledge got through self-consciousness. What are the intuitive convictions involved?

5. Give an analysis of what is involved in memory. What is the relation between the associations of ideas and memory? A person bears the report of a gun very loud, and immediately after trembles. How do you account for this?

6. Specify the psychological processes involved in the mind's apprehensions, or judgments regarding quantity.

7. Give a psychological account of conscience. What convictions are involved in its exercises?

8. How may the emotions be classified? Give a psychological account of the feelings of fear and of love.

9. How may acts of the understanding and of the conscience become morally good or evil?

10. What is meant when it is said that the mind has regulative principles? But has it forms to impose on objects? Distinguish between the regulative principles and innate ideas, and general axioms.

11. How does the mind reach necessary truths or axioms? What is the precise difference between a general law reached by observation and an intuitive maxim? To which class does the law of the uniformity of nature belong?

12. What seems to you to be involved in man's ideas as the infinite, the perfect? You are invited to notice existing controversies.

13. Unfold what is involved in the intuitive judgment of identity, and bring out more especially what is involved in our conviction as to our personal identity.

14. Show how the principle of causality is involved in the theistic argument. But does it constrain us to seek for an infinite series of causes?

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1. Did Bacon intend his Method to apply to mental as well as physical science? Under what modifications is the Method applicable to the study of the human mind? Is necessary truth founded on induction?

2. Can we prove our own existence? State, explain, and examine the statement of Descartes on this subject.

3. What is involved in substance? State and examine the definitions of substance by Descartes and Spinoza.

4. Locke derives all our ideas from sensation and reflection. What truth does there seem to be in this theory? and what oversights?

5. What, according to Locke, is truth, and what knowledge? What precise function does he allot to intuition? You are invited to offer comments.

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General Class Examination.

6. Give as clear an account as you can of the functions allotted to monads by Leibnitz.

7. What, according to Hutcheson, is the nature of the moral power? and what the nature of virtue? Offer comments.

8. In what sense did Berkeley admit, and in what sense deny, the existence of matter? How would you meet him?

9. Specify some of the fundamental truths denied by Hume. Take up some one of these and illustrate the manner in which he was met by Reid.

10. State and examine Kant's doctrine of cause and effect.

11. Who held that our feeling of beauty could be accounted for by the association of ideas? Examine their views.

12. Name the philosophical works of Sir W. Hamilton. What objections does he take to the doctrine of hypothetical realism in regard to sense-perception?

13. Who began, in France, the reaction against sensationalism? From what schools does Cousin profess to derive many of his views? What is his own peculiar system? Can his system be the last in philosophy? Give reasons for your answer.

POLITICAL ECONOMY AND JURISPRUDENCE.—*Examiner, Professor Leslie.*

POLITICAL ECONOMY.

1. How is the average rate of profit affected by—
   - (*a*) The competition of capitalists in the labour market?
   - (*b*) The competition of capitalists in the production and sale of commodities?
   - (*c*) The average interval between advances and returns?
   - (*d*) The cost of the natural agents employed in production?
2. How is the average rate of wages affected by—
   - (*a*) The *amount* and *kind* of national capital?
   - (*b*) The mode of expenditure of the national income?
   - (*c*) The average interval between advances and returns?
   - (*d*) The introduction of machinery?

3. State the general rule respecting the effect of high wages in a country, caused by a great efficiency of labour, upon the price of produce generally, both manufactured and raw.

4. Prove, from the effect of competition upon wages and profit in England, the following propositions, putting monopoly aside:—
   - (*a*) That the price of English commodities in foreign countries is regulated by their cost of production, including the expenses of exportation and taxation; and that the price of exportable commodities cannot be permanently above their cost of production.
   - (*b*) That a great foreign demand for English commodities tends to raise the price of English labour alike in the home and the foreign trades.
   - (*c*) That it tends to raise the price of English raw produce, and generally to lower the price of English manufactures.

5. Trace the probable effect of a continuance for a long period of the present rate of production of gold upon—
   - (*a*) The price of *gold* and *silver* plate and ornaments.
   - (*b*) The price of raw material and manufactures respectively.
   - (*c*) The price of land.
   - (*d*) The price of the funds, and the rate of interest.

6. What is the limit to the fall in the real and nominal exchange respectively?

7. What circumstances naturally determine the amount of metallic and paper currency, respectively, necessary for the trade of the United Kingdom?

8. Prove the following propositions (from *Bastiat's Economic Sophisms, Porter's transl.*, p. 55):—
   - (*a*) Protective duties do not equalize the conditions of productions.
   - (*b*) Free trade brings those conditions as much as possible to the same level.
   - (*c*) The countries least favoured by nature gain the most by free trade.

9. Expose the sophism of the following argument:—

"Suppose England to manufacture, from English materials, gloves to the value of £1,000,000 a year. This million first affords income to that amount of

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General Class Examination.

the population; and secondly, creates a market to that amount for other English products. Now, suppose that French gloves can be imported cheaper by five per cent. than English gloves can be made, and that, accordingly, all consumers buy French gloves instead of English ones. . . Now take the account. . . Glove consumers have gained by the change £50,000 a year. But Englishmen, as a body, have lost £950,000 a year. Nor does the mischief stop here. Other English commodities, which have lost their market, will, to that extent, cease to be produced."—(*Sophisms of Free Trade, by a Barrister*, p. 29, &c.)

10. What effect would an immediate and total repeal of protective duties in Europe and America produce upon—

   (*a*) The amount of general wealth?
   (*b*) The rate of wages in France?
   (*c*) The rent of land in America?
   (*d*) The price of raw and manufactured produce respectively?

11. Prove and illustrate the following proposition:—"A part of the taxes received by the government of one country is often paid by another."—(*Senior's Treatise on Political Economy*.)

12. What causes will regulate the extent of the fall occasioned by Mr. Gladstone's financial policy, in the price of paper, foreign wines, and British linens, respectively?

13. Who are the losers by the destruction by fire of insured dwelling-houses, and buildings for the purpose of trade respectively?

14. Trace the effect of the stream of gold from Australia and California upon the distribution of European and Asiatic produce.

JURISPRUDENCE.

1. What is, according to Adam Smith (*Theory of Moral Sentiments*), the place of Jurisprudence in Moral Science?

2. Explain the nature of the distinction between Jurisprudence and Casuistry.

3. Show, by reference to the following passage, that Jurisprudence is an inductive science, and state briefly its province and method—"Till this happens, the profession of the law will scarce deserve to be ranked among the learned professions: and whenever it happens, one of the vantage grounds to which men must climb is *metaphysical*, and the other *historical* knowledge. They must pry into the secret recesses of the human heart, and become well acquainted with the whole moral world, that they may discover the abstract reason of all laws: and they must trace the laws of particular states, especially of their own, from the first rough sketches to the more perfect drafts; from the first causes or occasions that produce them, through all the effects, good and bad, that they produced."—(*Bolingbroke on the Study of History*.)

4. Mr. Austin says: "The term Command comprises the term Law. And since it is the *key* to the services of Jurisprudence and Morals, its meaning should be analysed with precision." (*Province of Jurisprudence*, p. 6.)

   (*a*) What does this author mean by saying that the term Command is the key to Jurisprudence?
   (*b*) Can the key to an *Inductive* Science be found in any single word?

5. Mr. Mill observes: "One of the most notable specimens of reasoning in a circle is the doctrine of Hobbes, Rousseau, and others, which rests the obligation by which human beings are bound as members of society upon a supposed social contract." (*System of Logic*, Book V., Chap. vii.) Explain the doctrine of the Social Contract, and show how it involves this species of fallacy.

6. What is Mr. Austin's explanation of the terms Positive Law, Sovereignty, and Independent Political Society?

7. What is, in your opinion, the foundation of Law in general, and of the institution of Property and Inheritance, respectively, in particular?

8. What was the essence or basis of the Feudal System, and how did that system invert, as Adam Smith describes it, the natural progress of opulence?

9. Does it follow that the Feudal Laws and Customs actually retarded the increase of wealth and civilization in the middle ages?

10. What are the best provisions which the Law can make, in the present state of society, for the subsistence of the people and the increase of wealth?

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11. Quote, from Bentham, some examples of false methods of reasoning in Jurisprudence.

12. State the chief argument for and against Trial by Jury in civil cases.

13. State the chief arguments for and against the "Rule of Unanimity."

14. State the principal changes which the Law of Evidence has undergone in the present reign, and explain their policy.

SENIOR STUDENTS.

MATHEMATICS.—*Examiner, Professor Tait.*

1. In a spherical triangle $\cos a = \cos b \cos c + \sin b \sin c \cos A$. Provo this, and deduce from it the corresponding formula for a plane triangle.

2. Given the direction-cosines of two lines, find the angle between them. E.g. $(a_1x+b_1y+c_1z=0,\ a_2x+b_2y+c_2z=0)$ and $(a_3x+b_3y+c_3z=0,\ a_4x+b_4y+c_4z=0)$.

3. Find the length of the perpendicular from (a,b,c) npon

$$\frac{x-\alpha}{l}=\frac{y-\beta}{m}=\frac{z-\gamma}{n}.$$

4. If $l_1m_1n_1$, $l_2m_2n_2$, $l_3m_3n_3$, be direction-cosines of three mutually perpendicular lines, show that

$$\begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ l_3 & m_3 & n_3 \end{vmatrix}^2=1.$$

5. Show how to find the locus of the foot of the perpendicular from the origin upon a tangent plane to a surface.

E.g. $xyz=a^3$.

6. Form the general differential equation to conical surfaces, and integrate it.

7. Find the envelope of $(\alpha x+\beta y+\gamma z)(\,(b\gamma-c\beta)x+(c\alpha-a\gamma)y+(a\beta-b\alpha)z)-C=0$, where a, b, c are constants and $\alpha^2+\beta^2+\gamma^2=1$.

8. Given $Pdx+Qdy+Rdx=0$, investigate the condition that it may be derivable from a single primitive. Show how to find the latter, and explain the nature of the integral if the condition be not satisfied. To what do these correspond in Geometry of Threc Dimensions?

9. Define $\Delta^n 0^m$, and calculate the values of $\Delta^3 0^4$ and $\Delta^5 0^5$. Employ these differences of zero in summing to n terms the series $1^m+2^m+3^m$ &c., where m is a positive integer.

E.g. $1^3+2^3+\ldots\ldots\ldots\ldots\ldots+29^3$.

10. Given $n-1$ of n equidistant values of a function, show how to find the nth. Find log 24, having the logs of 21, 22, 23 and 25, equal respectively to 1·3222193, 1·3424227, 1·3617278 and 1·3979400.

11. Find the equation to curves which possess the property that all lines drawn through the pole, and terminated both ways by the curve, are equal. Givo particular cases.

12. Find the variation of

$\int_a^b Vdx$, where $V=f(x, y, \frac{dy}{dx}\frac{d^2y}{dx^2}$ &c., and the limits a and b aro constants.

Why is it not necessary to make x vary?

13. Find the curve which, with given area, and joining given points, has the least perimeter.

14. Find a property of the chord which cuts off from a given curve a segment of given area such that its perimeter is a minimum.

Applied Mathematics.

1. Is the parallelogram of forces a purely physical theorem? Can it be proved without the use of the principle of "transmission of force?"

2. Define a *couple.* Enunciate their principal properties, and prove that couples are equivalent if their axes are equal.

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3. Find the resultant of a system of parallel forces, and deduce the formulæ for the co-ordinates of the Centre of Gravity of any mass. Find that of a sphere whose density varies as the square of the distance from a point in its surface.

4. A heavy uniform rod stands on a rough horizontal plane, and leans against a rough vertical wall. Find the limiting position of equilibrium—(1) when the rod is, (2) when it is not, in a vertical plane perpendicular to the wall.

5. Assuming the principle that for the stable equilibrium of a system its centre of gravity must be as low as possible, investigate the equation to the common catenary.

6. Find the *potential* of an uniform sphere at an external point. Define carefully the *potential* of any attracting mass, and show how from it to find the attraction on any point in any given direction.

7. Show how to find the *relative* orbit of A with respect to B when the positions of both are given in terms of the time. E.g.—A moves horizontally, B vertically, from a given point, A uniformly, B with uniformly accelerated velocity. Find the relative path.

8. Find the greatest range, on an inclined plane passing through the point of projection, of an unresisted projectile.

9. Write down, and integrate twice, the equation of motion of a particle, in a straight line to a centre of force—the force varying directly as the distance, and the position and velocity of the particle being given at a given time. Enumerate the most important cases of this kind of motion now known to occur.

10. Prove that in an orbit described about a single centre of force

$$r^2\frac{d\theta}{dt} = \text{constant},$$

and employ this equation to compare the times of describing different arcs of a parabola from the vertex—the centre of force being in the focus.

11. Define the *Hodograph* generally, and show that for an undisturbed planetary orbit the Hodograph is a circle.

FIRST YEAR ENGINEERING STUDENTS.

MINERALOGY AND GEOLOGY.—*Examiner, Dr. Wyville Thomson.*

1. Describe and distinguish *Granite*, *Syenite*, *Gneiss*, and *Mica-Slate*.

2. Describe some of the various kinds of Granite, with their differences in composition.

3. What is Porphyry? and under what circumstances does it occur?

4. What is the principle of the *Artesian Well*?

5. Name some of the characteristic plants of the Coal formation.

6. What is the structure and general appearance of Lepidodendron?

7. What is Stigmaria?

8. Divide Fishes into four orders, according to the structure of their *Scales*, and describe the structure of the Scale in each order.

9. Assign its Zoological position to the order *Eurypteridæ*, and mention the formation of which the remains of this order are most characteristic.

10. Give the subdivisions of the Mesozoic formations, in descending series, from the Maestricht Chalk to the Lower Lias inclusive.

SURVEYING AND MAPPING, &c.—*Examiner, Professor James Thomson.*

1. How many square feet are there in 17A. 3R. 24P.? State the same area as a decimal fraction of a square mile.

2. If a tract of ground be marked out on a good map, how may its area be found?

3. In an ordinary Y theodolite is there one, and only one, proper position which the intersection of the cross wires may occupy in the plane of the motion communicated to it by the two pair of diaphragm adjustment screws, the position of the object-glass in the tube being regarded as permanently fixed?

4. In Gravatt's level is there one, and only one, proper position which the horizontal wire may occupy in the plane of its motion communicated to it by the

pair of adjustment screws, the position of the object-glass in the tube being regarded as fixed?

5. Describe the parallax and collimation adjustments of an ordinary Y theodolite.

6. How is the process of levelling affected by the curvature of the earth and by atmospheric refraction? In your answer, distinguish between cases in which these influencing circumstances, separately or jointly, may be neglected in practice, and others in which important corrections for either or both must be made, and in which uncertainties will still remain.

7. Describe any of the ordinary methods of conducting a traverse survey, and explain how to compute the area by reference of the measurements to rectangular co-ordinates.

8. Describe the two principal methods of plotting a traverse survey—one with rectangular co-ordinates and the other without.

9. Describe accurately what is meant by Geometrical or Linear Perspective.

10. Why is it that the representations of vertical lines are usually made vertical in perspective pictures; and how must horizontal lines be situated so that their representations may be horizontal?

11. How is the vanishing point of an original straight line to be found, and why so?

12. Given two planes, by their traces it is required to find the projections of their intersection. Point out more than one of the chief varieties of cases of this problem.

13. Explain how, when the three sides of a triangle, and a split line, and the segments into which the split line divides the side it meets, are measured, the measurement of the sides may be checked by computation, without the use of logarithms. Also show why it is that the measurement of the sides and split line will not generally afford a proper check on the measurements of the segments of the side.

14. State the ordinary rule or formula for computing, by the aid of logarithms, the area of a triangle when the sides are given.

15. State the ordinary rules or formulas for finding the remaining parts, either sides or angles, of a triangle—1st, when the two sides and the contained angle are given; and 2nd, when the three sides are given.

16. Give the reading of the horizontal limb of the theodolite before you for the position at which it is clamped.

17. Work out the reduced levels in the following portion of a field book,* and give the proper check on your work.

18. Compute the area of the enclosure shown surveyed in the annexed leaf of a field book,* and give checks applicable to the principal parts of the field work and of your calculation.

ELEMENTARY MECHANICAL DRAWING.

The examination comprised questions proposed at the general examination at the end of the course, and also a scrutiny of drawings executed during the Session.

SECOND YEAR ENGINEERING STUDENTS.

PRACTICAL MECHANICS.—*Examiner, Dr. Stevelly.*

1. Required the number of foot-pounds of work which a man, who weighs 12 stones, experiences in walking eight miles, each step he takes being 3 feet, and his centre of gravity rising and falling 1½ inches each step. Also, state the part of a horse-power he is exerting if he accomplish the journey in 2 hours and 14 minutes.

2. In what time will an engine of 36 effective horse-power raise 4 tons of ore from a mine 180 fathoms deep?

3. An engine drives 3 pumps which lift water from 3 several levels in a mine. The first, through 40 fathoms, 30 cubic feet of water per minute; the second

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* Printed for the Examination, but not reprinted.

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lifts 10 cubic feet through 80 fathoms; and the third, 40 cubic feet through 100 fathoms; the modulus of the system of engine and pumps is 0·66. Required the gross horse-power of the engine.

4. Required the number of foot-pounds of work expended in overturning a cube of granite six feet long, broad, and deep, and whose specific gravity is 2·72, round one of its edges.

5. Required the horse-power of a locomotive engine which keeps a train weighing 90 tons running at the uniform rate of 50 miles an hour down an incline of $\frac{1}{4}$ in 100, the resistance of the air to that train having been determined previously to be 33 lbs. when it was running 10 miles an hour, and the usual allowance being made for friction.

6. Explain any of the methods of determining experimentally the coefficient of friction between two given surfaces. Explain also the distinction between statical and dynamical friction, and the connexion between friction and the limiting angle of resistance.

7. Explain the arrangement in the Stanhope combination of levers, and show, from the principle of the line, that at the commencement of the action the lever which works the screw turns rapidly with but little power, while, at the end of the pull the power is enormous, but the motion of the screw or pressure-plate very slow.

8. A simple screw, with $\frac{1}{2}$ inch interval between the threads, turned by a 3 feet lever, is worked by 60 lbs. at the end of the lever. Find the pressure which its pressure-plate exerts.

9. Find the distance from the fulcrum at which a weight of 59 lbs. must be placed on a lever of the second order, a uniform prismatic rod, 20 inches long, and weighing 5 lbs, to keep a safety-valve which exposes a surface of 8 square inches, *shut* until the steam acquire an elastic force of 54·71 lbs. above atmospheric pressure, the lever bearing on the valve-pin at 2 inches from its fulcrum.

10. Explain the distinction between "single" and "aggregate" motion of elementary combinations in pieces of mechanism.

11. If the velocity ratio of two pieces in a train of mechanism be constant, show that the ratio of the whole motions (whether linear or angular) in any time, large or small, is the same as the velocity ratio at any instant.

12. Show that if the teeth of any 2 wheels which gear, be formed to the shape of involutes of the pitch circles, the ratio of the sliding motion at any instant, to the angular motion of the point of contact round either centre, varies as the perpendicular let fall from the other centre, on the radius of contact from that first centre.

CIVIL ENGINEERING.—*Examiner, Professor James Thomson.*

1. Explain the meaning of the term, *the line of least resistance*, as employed by Sir John Burgoyne in reference to the apportionment of the amount of gunpowder to be used for a blast; and state the leading principle according to which he directs that the proper charge should be determined in contradistinction to the prevailing practices of quarrymen.

2. In a tunnel of such length that several shafts are required, describe the process by which the line of the workings proceeding from the bottom of each shaft may be set out in the direction ranged above ground for the tunnel, and state by what means the two portions of the brickwork proceeding from the two shafts towards one another can be made accurately to meet.

3. Describe two distinct methods of bearing up the brickwork of the shafts of tunnels during the process of excavating underneath for the tunnel.

4. What is the process of *Sumping*, as used by Simms, and described in his work on tunnelling?

5. Describe the manufacture of Portland and Roman cements, and describe the chief qualities on which their value as constructive materials depends.

6. What is the distinction between *rich lime* and *hydraulic lime*?

7. By what length, breadth, and thickness, is the standard or reduced rod of brickwork usually defined, and how many cubic feet does it contain?

8. Give a description of the Ionic Order of Architecture, and state what was the change which was introduced into the capital subsequently to the early

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Grecian examples, and what constructive difficulty occasionally arising led to this change.

9. Give the names of the eight mouldings used in Classical Architecture, accompanied by sketches.

10. Give a description, accompanied by a hand-sketch, of the Attic Base.

11. Give a brief description of the Grecian Doric Order, distinguishing it from the variety called Roman Doric, and also from the Tuscan.

12. What weight applied as a pull to a bar of good ordinary wrought iron, one square inch in section, may be expected to be just sufficient to cause fracture?

13. In the tests of the wire to be used for the main cables of the Niagara Suspension Bridge it was found that the wire was 18·3 feet in length to the pound weight, and when stretched between two posts 400 feet apart, the points of support being on the same level, the average deflexion at which rupture took place was found to be 8·2 inches. Taking the specific gravity of the wire at ·282 lbs. to the cubic inch, find—first, what was the tension in pounds to which the wire was subjected; and secondly, what was the pull per square inch of cross section which broke it.

14. In reference to perspective, explain the following terms as they have been applied in the lectures:—Point of View, Vanishing Point of an Original Line, Axis of Symmetry, Centre of Symmetry, Horizon-Line, Central Vertical Line.

15. How must a sphere be placed so that its perspective representation may in perfect strictness be truly a circle, and what will be the nature of the representation when the sphere is otherwise situated?

16. Explain, according to the lectures, how it is that the choice of the field of view, as limited by the edges to be selected for the picture (the distance of the eye from the picture being fixed) is arbitrary, and does not depend (as it is by many authors stated to do) on the angular space which can be distinctly viewed by the eye at one glance.

17. Supposing three points to be given by their projections, describe, without reference to a diagram, how to find the traces of the plane which passes through the three points.

18. Given the traces of a plane, it is required to find the angles which the plane makes with the two planes of projection.

19. Taking the accompanying field notes[*] as giving the section of the ground along the centre line of a proposed road having base 30, and slopes 2½ to 1, and having the base at a uniform level 3·50 feet above datum, find the amount of cutting in cubic yards. Depths of cutting at the various points at which the levels are given are to be counted to the nearest whole foot.

DRAWING.

The examination comprised questions proposed at the general examination at the end of the course, and a scrutiny of drawings executed during the Session.

FIRST YEAR AGRICULTURAL STUDENTS.

THEORY OF AGRICULTURE.—*Examiner, Dr. Hodges.*

1. State the average composition of the Tuber of the Potato, the Bulb of the Turnip, and the Seed of Wheat.

2. What are the ingredients which the Flax plant abstracts from the soil?

3. Give an account of the structure of the stem of the Flax plant.

4. Calculate the value of an average sample of Superphosphate of Lime.

5. What are the views at present held with respect to the absorbing qualities of soils?

6. State the average composition, and calculate the value, of a sample of Peruvian Guano.

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[*] Field Notes furnished at Examination, but not printed.

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SECOND YEAR AGRICULTURAL STUDENTS.

PRACTICE OF AGRICULTURE.—*Examiner, Dr. Hodges.*

1. Describe the methods of Drainage recommended by Smith, of Deanston.
2. What is the method of managing the Flax crop which you would recommend?
3. What was the plan of cultivation advocated by Tull, and recently partially revived in this country?
4. How should Fattening Cattle be managed?

HISTORY AND DISEASES OF FARM ANIMALS.—*Examiner, Dr. Hodges.*

1. Describe the Durham Ox.
2. Arrange the cattle kept in these countries under the two heads of "Milk-giving" and "Fat-producing."
3. What is the treatment of the disease termed "Molten Grease?"
4. Describe the organs of Respiration in the Ox.

FACULTY OF MEDICINE.

FRENCH.—*Examiner, Dr. Frings.*

As the increase of the body, the development of its organs, and the supply of its waste, depend entirely on the blood, the quantity of this fluid must necessarily be constantly diminishing, and require, therefore, replenishment. This is accomplished by the introduction of those substances into the stomach which are capable of being converted into blood; but whatever variety of food may be employed, that only can renew the blood, and consequently nourish the body, which contains one or other of the three animal constituents termed *fibrin*, *albumen*, and *casein*. These contain nitrogen, and are found in both animal and vegetable substances. It is true, other elements enter into the composition of the various articles employed for the food of animals; such as starch, gum, sugar, fat, &c. None of these, however, contain nitrogen; they are termed, therefore, hydrocarbons; and, although not alone competent to the nourishment of the body, they perform the very important office of supplying the materials for the production of the animal heat, and are, therefore, essential to the preservation of health. Hence it is that in cold climates we find the inhabitants require large quantities of oil, fatty substances, and alcohol, to supply the heat which is constantly being abstracted from the surface of the body.—B. COOPER.

PRACTICAL CHEMISTRY.—*Examiner, Dr. Andrews.*

1. Give an account of the methods of taking the density of a solid substance.
2. Describe the method of analyzing a mixture of nitrogen, hydrogen, and carbonic acid.
3. How is the amount of air contained in a given volume of spring water determined?
4. In what way may small quantities of potash in presence of soda be discovered by means of the blowpipe?
5. What are the properties of the ammoniaco-magnesian phosphate? State also its composition, and the composition of the substance into which it is changed when heated to redness.
6. Describe the method of analyzing and of separating all the component parts of a compound of oxalate and phosphate of lime.
7. State generally the method of analyzing a mineral containing silica, lime, magnesia, sesquioxide of iron and alumina.
8. If a siliceous mineral contains soda or potash, how is its amount determined?
9. What are the distinguishing tests for arsenic and antimony?
10. How is the meconic acid separated from opium, and what are its characteristic properties?
11. Enumerate the principal alkaloids in opium, and the method of separating them.

12. State the composition of bile, and its tests.

13. How is the presence of sulphur in an albumenoid body established?

14. How is the amount of sulphur ascertained in such a body as taurine or cystic oxide?

FIRST YEAR STUDENTS.

FACULTY of LAW.—JURISPRUDENCE.—*Examiner, Professor Leslie.*

1. Describe the province, purpose, and method of the science of Jurisprudence.

2. State and criticise Mr. Austin's conception of the province of Jurisprudence.

3. Give some examples both of the historical and philosophical methods of studying the science from the writings of celebrated philosophers.

4. Write a short account of the sources and condition of the law of England at the period of the Norman Conquest.

5. Write a short account of the sources and growth of the law of England as it now is.

6. To what circumstance is the improvement of English Jurisprudence in the 12th and 13th centuries ascribed by Mr. Spence?

7. Explain the meaning of the term *Jurisprudence* in the last question, and likewise the meaning of the title of Montesquieu's work, *The Spirit of Laws.*

8. What have been the principal improvements in English judicial organization since the Norman Conquest?

9. Show that improvements in the economical condition of society bring about naturally improvements in its laws; and give examples of improvements in the laws of this country which are traceable to the operation of such natural causes.

10. Instance, on the other hand, examples of improvements in the economical condition of the country, arising from previous improvements in the law.

11. To what historical causes is the neglect of the study of the science of Jurisprudence in England ascribed by Sir Richard Bethell?

12. Sketch concisely the substance and purport of the article on the Expense of Justice in Book V. of the Wealth of Nations.

13. Write a very concise analysis of Lord Bacon's Tract on Universal Justice.

14. Comment on the following passage:

"What is said by Carneades and Horace—'Utilitas justi prope mater et æqui'—is not true. For the mother of Natural Law is human nature itself; and the mother of Civil Law is obligation by common consent, and since that consent derives its force from natural law, nature may be said to be the grand-mother of Civil Law. But Natural Law is confirmed by expediency." (Grotius, Prolegomena.)

SECOND YEAR STUDENTS.

CIVIL LAW.—*Examiner, Professor Leslie.*

1. What is the fundamental difference pointed out by Dr. Arnold between the Roman and the Feudal Jurisprudence relating to property in land?

2. What were the sources of the Corpus Juris Civilis?

3. Explain the following passage:—"The Jus Gentium of the earlier Roman lawyers is peculiar to the Roman law; whilst the latter is equivalent to natural law, as understood by modern writers upon Jurisprudence. The Jus Gentium of the earlier Roman lawyers was a purely *practical* notion: it arose from the peculiar relations borne by the Urbs Roma to her dependent allies and subject provinces. The latter is a purely *speculative* notion: it was imported by the classical jurists into the Roman law from certain hypotheses of Greek philosophers, respecting the measure or test of Law." (Austin's Province of Jurisprudence, Outline, p. xiii.)

4. State and criticise the doctrine of the Roman jurists respecting the foundation of the authority of customary law.

5. How was the Roman law preserved during the period between the barbarian invasions and the twelfth century?

Appendix, No. 8.

General Class Examination.

6. What were the causes of the opposition in England to the Roman law in the reigns of Stephen and Richard II. respectively?

7. How do you account for the resemblance between the Preface to Justinian's Institutes and the Preface to Glanville's Treatise on the Laws of England?

8. Explain the allusion to the Lex Regia in Glanville's Preface, and show that it has been generally misunderstood.

9. Explain the nature and causes of the influence of Roman upon English Equitable Jurisprudence, with examples.

10. State Savigny's general estimate of the merits of the Roman law.

11. What are, according to Dr. Maine (Cambridge Essays, 1856), the chief advantages derivable from the study of Roman Jurisprudence in England?

12. How do you account for the difference of the Maritime Jurisprudence of England from that of Rome in relation to the contracts of Bottomry and Respondentia, and of Insurance respectively?

13. "The Rhine," said the Emperor, "is mine. Holland is formed by the deposit of the Rhine; therefore it is a natural accession to the kingdom subject to my rule, and belongs to me." What doctrine of the civil law is referred to in this argument, and how do you answer it?

14. How does the English *heir-at-law* differ from the Roman *hæres?*

15. Explain the terms *querela inofficiosi,* and *legitima pars.*

16. The principle of *collatio bonorum* is recognised in English law?

17. Compare the organ of *fidei-commissu* with that of uses and trusts in England.

18. Compare the doctrines of English and Roman law relating to codicils.

Special Prize Examination.

POLITICAL ECONOMY.

1. State in general terms the circumstances upon which the future price of any given commodity will depend, and apply the principles so obtained to the following articles:—

   (*a*) Flax and linen manufactures respectively;
   (*b*) Raw cotton, and cotton manufactures respectively;
   (*c*) Wool, and woollen manufactures respectively;
   (*d*) Potatoes, bread, and butchers' meat respectively;
   (*e*) Coal, coke, and gas respectively;
   (*f*) Iron and machinery respectively.

2. What causes will govern the increase or decrease in the next ten years of—

   (*a*) The amount of land-rent in Ireland?
   (*b*) The rate of wages in America?
   (*c*) The rate of interest in India?
   (*d*) The rate of profit in France?

3. Trace the effect of the gold discoveries upon—

   (*a*) The amount of nominal wealth in the world;
   (*b*) The production of real wealth in the gold countries, Europe and Asia respectively;
   (*c*) The distribution of real wealth through the commercial world;
   (*d*) The currencies of the United States, France, Great Britain, and Asia respectively.

4. State very concisely the substance of Mr. J. S. Mill's exposition of the principles which regulate international values, appending any criticism, correction, or amplification you may think proper.

5. What causes will determine the necessary amount of metallic currency for the domestic trade of England in 1870?

6. State concisely the provisions of the Bank Charter Act of 1844, the objections urged against the principle and practical working of that Act, and the answers made to those objections.

7. How do variations in the real and nominal exchange respectively affect—

   (*a*) The exportation and importation of the precious metals?
   (*b*) The exportation and importation of other commodities?

8. Explain the principle of Mr. Pitt's Sinking Fund; expose its fallacy.

Appendix, No. 8.

General Class Examination.

9. State the arguments for and against raising the supplies for a large Government expenditure within the year.

10. State the four general maxims of taxation laid down by Adam Smith.

11. State the arguments for and against direct and indirect taxation respectively.

12. What are the arguments for and against export duties on raw materials?

JURISPRUDENCE.

1. (*a*) How does Mr. Austin determine the province of the science of Jurisprudence?

(*b*) State your own conception of the province of the science, concluding your description of its nature, purpose, and method with a definition.

2. In what sense did Dr. Adam Smith use the terms "Natural Jurisprudence" and "The History of Jurisprudence?"

3. "Upon this subject (Jurisprudence) Dr. Adam Smith followed the plan that seems to be suggested by Montesquieu: endeavouring to trace the gradual progress of Jurisprudence from the rudest to the most refined ages, and to point out the effects of those arts which contribute to subsistence and to the accumulation of property in producing corresponding improvements or alterations in law and government." (Life of Adam Smith by Dugald Stewart.) Cite, from your knowledge of history, examples of alterations and improvements in law brought about by natural causes in the manner described in this passage.

4. Prove the following propositions from Adam Smith's chapter on the Expense of Justice:—"The necessity of civil government gradually grows up with the acquisition of valuable property."—"So the principal causes which naturally introduce subordination gradually grow up with the growth of that valuable property."

5. What are, according to William Humboldt, the two grand objects of Political (*i.e.* Constitutional) Jurisprudence?

6. State the views of Adam Smith and Mr. J. S. Mill, respectively, concerning the principles by which the proper aims and limits of the functions of the State should be determined.

7. Explain the terms *Codification* and *Fusion of Law and Equity*, and give a succinct account of the historical causes which have produced the peculiar condition of the Laws of England to which the reforms so called are directed.

8. To what causes do you ascribe the origin of the difference of the Laws of England relating to real and personal property?

9. What advantages, according to Adam Smith and Bentham, arise from a competitive jurisdiction on the part of the superior courts?

10. State the substance of Lord Bacon's Maxims respecting the extension of laws.

MATRICULATION EXAMINATION.—OCTOBER, 1860.

Matriculation Examination.

LATIN.—*Examiner, Rev. Dr. Reichel.*

TO BE RE-TRANSLATED INTO LATIN.

In all Gaul there are two kinds of those men who are in some esteem and honour. For the commons are considered almost in the light of slaves, presuming to do nothing by themselves, and being admitted into no deliberative assembly. Great numbers, when depressed either by debt, or by the greatness of the imposts, or by the wrongs inflicted on them by the more powerful, give themselves over to the nobles as slaves. Over these persons the same rights exist which masters possess over their slaves. But of the two former classes the one is the class of druids, the other that of knights. The former take part in the conduct of religious worship, direct public and private sacrifices, explain religious rites: to them a great number of young men resort for instruction, and these persons are highly esteemed among them. For they determine almost all disputes, public and private, and if any crime has been committed, if a murder

Appendix, No. 8.

Matriculation Examination.

has been done, if there is a dispute about inheritance, about the bounds of property, these same persons decide it and affix rewards and penalties. If any private person or any state does not stand by their decision, they refuse the recusant admission to their sacrifices. This is the extremest penalty among them. Those against whom such an interdict has been issued are held in the number of the impious and accursed, all men go away from them, all shun their approach and converse, lest they should receive some injury from contact, and they are excluded at once from the benefit of law and from all honours. Over all these druids presides one person, who enjoys the supreme authority among them. When he dies he is succeeded either by the one who excels the rest in dignity or if there be several equal in this respect, by him who is elected by the druids; sometimes they even contend in arms for the primacy.

MATHEMATICS.—*Examiner, Professor Slesser.*

ARITHMETIC.

1. Find tho values in simple fractions of

$$\frac{2\frac{1}{4}}{3\frac{1}{2}+2\frac{1}{3}}+\frac{1\frac{1}{5}+1\frac{3}{4}}{20\frac{1}{4}} \text{ and } \frac{1}{2}-\frac{2}{3}+\frac{3}{4}-\frac{4}{5}+\frac{5}{6}-\frac{3}{10}.$$

2. State the rule for the multiplication of decimal fractions, and find tho valnc of 2·1345+·0032+·00125; and divide ·0035875 by ·03125.

3. Find the sum of ·625 of £1, $\frac{1}{13}$ of a guinea, and $\frac{1}{3}$ of £2 19*s*. 1½*d*.

4. Find the square of 20·199, and the square root of 16·6464.

5. A merchant buys 52 dozen bottles of wine for £110, and after keeping it for 3 years, he finds that 5 bottles have been broken, and the wine in them lost, and the wino in 16 others so damaged as to be reduced in valne to half that of the sound wine. At what price per bottle must he sell the remaining wine that he may gain 6 per cent. per annum in the monoy invested on the purchase?

6. A person sells 375 of the 3 per cent. stock when they are at 91, and invests the proceeds in 3¼ per cent. stock, which are at 104. Will his yearly incomc from this source be increased or diminished by the transaction, and by how much?

ALGEBRA.

1. Simplify the expressions

$$a-[2a-\{b-c+2d-(a-d)\}];$$
$$x-\tfrac{1}{2}\{\tfrac{2}{3}-x-\tfrac{1}{3}(1\tfrac{1}{4}-x)-\tfrac{1}{3}(1\tfrac{1}{2}-\overline{2x-2\tfrac{1}{4}})\}.$$

2. Multiply $1-\frac{x}{2}-\frac{x^2}{4}-\frac{x^3}{8}$ by $8+4x+2x+x^3$; and divide x^4-81 by $\frac{1}{3}x-1$;

also reduce to its simplest form $\frac{x^3}{x-1}-\frac{x^2}{x-1}-\frac{1}{x-1}+\frac{1}{+1}$.

3. Solve the following equations:—

(1) $x-\frac{x-1}{2}-\frac{x-2}{3}-\frac{x-3}{4}=0.$

(2) $\frac{4-\frac{1}{2}(x-1)}{3}-\frac{x-\frac{1}{3}(2x-5)}{2}+3\frac{1}{2}=0.$

(3) $\frac{x-a}{x}=\frac{x}{x+b}.$

(4) $\frac{m}{x}+\frac{n}{x}=\frac{1}{m}+\frac{1}{n}.$

4. Find the least common multiple of x^3+2x^2+4x+8 and x^2-4, also of $4a^2b^2-(a^2+b^2-c^2)^2$ and $a^2+b^2+c^2+2(ab-ac-bc)$.

Find a number which shall exceed 20 by one-third of the amount by which 20 exceeds its third part.

Scholarship Examinations.—October 1860.

Appendix, No. 8.

Scholarship Examinations.

Literary Scholarships.—First Year Students.

Greek.—*Examiner, Professor MacDouall.*

I.—1. Translate accurately, but with elegance, the following Ode from the *Mēdeia* of Euripides:—

ΧΟΡΟΣ. Ἐρεχθεΐδαι[1] τὸ παλαιὸν ὄλβιοι   *στρ. α'.*
καὶ θεῶν[2] παῖδες[2] μακάρων, ἱερᾶς
χώρας ἀπορθήτας[8] ἀποφερβόμενοι
κλεινοτάταν σοφίαν, αἰεὶ διὰ λαμπροτάτου[3]
βαίνοντες ἁβρῶς αἰθέρος,[3] ἔνθα ποθ' ἁγνὰς
ἐννέα[4] Πιερίδας Μούσας[4] λέγουσι
ξανθὰν Ἁρμονίαν[5] φυτεῦσαι,[5]
τοῦ καλλινάου γ' ἐπὶ Κηφισοῦ[6] ῥοαῖς,   *ἀντιστρ. α'.*
τὰν[9] Κύπριν[7] κλῄζουσιν ἀφυσσαμέναν[9]
χώραν[10] καταπνεῦσαι[11] μετρίαις ἀνέμων
ἁδυπνόοισι πνοαῖς,[11] αἰεὶ δ' ἐπιβαλλομέναν
χαίταισιν εὐώδη ῥοδέων πλόκον ἀνθέων
τοὺς Σοφίᾳ παρέδρους πέμπειν Ἔρωτας[7]
παντοίας ἀρετᾶς ξυνεργούς.
τίς[12] οὖν ἱερῶν ποταμῶν[12] ποτ' ἢ φίλων[13]   *στρ. β'.*
πόμπιμός[13] σε χώρα
τὰν παιδολέτειραν ἕξει
τὰν οὐχ ὁσίαν ; τάλαινα !
σκέψαι τεκέων πλαγάν,
σκέψαι φόνον οἷον αἴρει !
μή, πρὸς[14] γονάτων[1] σε πάντες[15]
πάντως ἱκετεύομεν,[15]
μὴ[16] τέκνα φονεύσῃς ![18]
πόθεν δὲ θράσος χερός, ὦ τέκνον ! πόθεν   *ἀντιστρ. β'.*
καρδίας σὺ λήψει
δεινὰν προςάγουσα τόλμαν ;
πῶς δ' ὄμματα,[17] προςβαλοῦσα
τέκνοις ἄδακρυν μοῖραν,
σχήσεις[17] φόνῳ ;[17] οὐ δυνάσει,
παίδων ἱκετᾶν πιτνόντων,
τέγξαι[18] χέρα φοινίαν[18]
παντλάμονι θυμῷ.

2. Mention such various readings of importance as you remember,—translate those which you think intelligible,—and briefly discuss them in reference to consistent sense, to the laws of syntax, and to antistrophic metre.

3. Explain and elucidate the mythological, archaeological, and historical allusions in the words or phrases numbered from 5 to 7. You may adduce or refer to parallel passages in other Poets, Classical or English.

4. Discuss briefly the grammatical peculiarities and idiomatic combinations exemplified in the words numbered from 8 to 18.

5. (*a*) Point out separately the Doric and the Epic forms of words in this passage, giving the Attic equivalents of both. (*b*) Account for the admission of such forms in the lyric portions of Tragedy.

6. Parse accurately and fully,—resolving compounds into their elements,—these vocables: *ῥοδέων, ἀνθέων, ἱκετᾶν, φοινίαν, παρέδρους, ξυνεργούς, ἀπορθήτας, καλλινάου, εὐώδη, παντλάμονι, παιδολέτειραν, αἴρει, τέγξαι, πιτνόντων, ἀφυσσαμέναν.*

II.—1. Date the first representation of the *Mēdeia*, reckoning as well by years B.C. as by Olympiads, and noting the age of the Dramatist at the time. 2.

Appendix, No. 8. — Scholarship Examinations.

Mention (*a*) the chronological place of this play among Euripides' extant works,—(*b*) the titles of the three others said to have been associated with it in a tetralogy,—(*c*) the number of actors which it required,—(*d*) the rank which was assigned to it by the arbiters of the prizes.

III.—Describe concisely the construction of the principal tragic metres.

[*Extracts from* LUCIANUS *and* XENOPHON *also were set in this Examination.*]

LATIN.—*Examiner, Rev. Dr. Reichel.*

[*The Latin Examination was chiefly oral.*]

HISTORY AND THE ENGLISH LANGUAGE.—*Examiner, Professor Craik.*

1. A short, but very carefully written, Essay, *by every competitor*, on *one* of the following subjects:—

Leaving Home for the first time;
Going to School;
Leaving School;
Coming up to College;
The Morning of Life's day;
The Choice of a Profession.

2. Give an account of either the battle of Hastings, or that of Crecy, or that of Poictiers, or of the deposition of Richard II., or of the battle of Bosworth, or of the defeat of the Spanish Armada, or of the victory of Trafalgar, or of that of Waterloo.

3. Describe the situation of Rome, in respect of the hills, the river, and the sea.

4. Give an account of the battle of Zama, or of the conspiracy of Catiline, or of the assassination of Julius Cæsar, or of the battle of Philippi, or that of Actium, or of the death of Nero.

SECOND YEAR STUDENTS.

GREEK.—*Examiner, Professor MacDouall.*

[*The Greek Papers not reprinted.*]

LATIN.—*Examiner, Rev. Dr. Reichel.*

[*The Latin Examination was chiefly oral.*]

HISTORY AND ENGLISH LITERATURE.—*Examiner, Professor Craik.*

1. A short, but very carefully written, Essay, *by every competitor* on *one* of the following subjects:—

The Town and the Country;
The Boy and the Man: in what they resemble and in what they differ;
School and College.

2. Describe in general terms, and without going into details, the constitution of the English Language in A.D. 900 (commonly called Saxon, or Anglo-Saxon); in A.D. 1200 (commonly called Semi-Saxon); and in A.D. 1400:—in each case in respect, first, of the Vocabulary; secondly, of the Grammar.

3. Give a succinct account *either* of the Brut of Layamon, or of the Chronicle of Robert of Gloucester, or of the Chronicle of Robert de Brunne, in respect of the Subject, the Language, the Verse, the Sources, and the Bibliography.

4. Describe the present state of the English Language, in respect of the proportions in which the two great constituent elements of its vocabulary are mixed up in it, and of the functions which they severally perform.

MODERN LANGUAGES.—*Examiner, Professor Dr. Frings.*

FRENCH.

Mon cher ami, hélas! vouz avez la goutte au pied, au coude, au genou; cette douleur n'aura pas grand chemin à faire pour tenir toute votre petite personne. Quoi, vous criez! vous vous plaignez! vous ne dormez plus! vous ne mangez plus! vous ne buvez plus! vous ne chantez plus! vous ne riez plus! Quoi, la joie et vous ce n'est plus la même chose! Cette pensée me fait pleurer; mais pendant que je pleure vous êtes guéri, j'espère, et je le souhaite. Vous devez avoir reçu nos lettres du quinze mai, qui vous auront fait voir qu'enfin nous avons reçu toutes les vôtres; et même celle-ci répond à deux, car nous vous devons la réponse du vingt mai et du douze juin. Voilà donc notre compte; je serais bien fâchée d'en avoir perdu aucune des vôtres; outre leur prix, que vous savez que j'estime, elles ont quasi toujours été accompagneés des ouvrages de M. de Nevers, dont j'ai fait unpetit recueil que je ne donnerais pas pour bien de l'argent.

M. de La Brosse veut que ma lettre l'introduise auprès de vous; n'est-ce pas se moquer des gens? Vous savez l'estime et l' amitié que j'ai pour lui; vous savez que son père est l'un de nos plus anciens amis; vous savez vous-même le mérite de l'un et de l'autre, et vouz avez pour eux tous les sentiments que je voudrais vous inspirer: vous voyez donc bien que ma lettre ne peut lui être utile. C'est à moi qu'elle est très bonne; car, en vérité, j'aime à vous écrire. C'est une chose plaisante à observer, que le plaisir qu'on prend à parler, quoique de loin, à une personne que l'on aime.—MAD. DE SEVIGNE.

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1. Give Infinitive of the following past participles: *né*, *dû*, *paru*, *cru*, *crû*, *conçu*, *peint*.
2. Give the Future of the following verbs: *savoir*, *devoir*, *vouloir*, *avoir*, *mourir*, *bâtir*, *pouvoir*, *faire*.
3. When is the *Imperfect* used in French, and when the *Perfect?*
4. Is the numeral adjective *cent* flexible or not? State all that you know about it, as well as any other numeral adjective that may require a rule.
5. State all you know about the use of French *reflective* verbs. Give illustrations of such instances as are differently expressed in English.
6. When is the preposition *to* before an Infinitive in English, rendered in French by *à*, when by *de*, and when by *pour*, and when is it passed over in silence in French?
7. When is *more than* rendered by *plus de*, and when by *plus que?*
8. What is the difference between "*l'année dernière*," and "*la dernière année?*"
9. What difference is there between "*I would have corrected my exercise*," and "*I would have my exercise corrected?*" Translate it into French.
10. How is the verb "*to have*" translated into French, when followed by an Infinitive in English?

GERMAN.

Nicht leichtſinniger Weiſe, ſing Guſtav Adolph an, ſtürze ich mich und euch in dieſen neuen, gefahrvollen Krieg. Mein Zeuge iſt der allmächtige Gott, daß ich nicht aus Vergnügen fechte. Der Kaiſer hat mich in der Perſon meiner Geſandten aufs Grauſamſte beleidigt, er hat meine Feinde unterſtützt, er verfolgt meine Freunde und Brüder, tritt meine Religion in den Staub, und ſtreckt die Hand aus nach meiner Krone. Dringend flehen uns die unterdrückten Stände Deutſchlands um Hülfe, und wenn es Gott gefällt, ſo wollen wir ſie ihnen geben.

Ich kenne die Gefahren, denen mein Leben ausgeſetzt ſeyn wird. Nie habe ich ſie gemieden, und ſchwerlich werde ich ihnen ganz entgehen. Bis jetzt zwar hat mich die Allmacht wunderbar behütet; aber ich werde doch endlich ſterben in der Vertheidigung meines Vaterlandes. Ich übergebe euch dem Schutz des Himmels. Seyd gerecht, ſeyd gewiſſenhaft, wandelt unſträflich, ſo werden wir uns in der Ewigkeit wieder begegnen.

An Euch meine Reichsräthe, wende ich mich zuerſt. Gott erleuchte euch und er fülle euch mit Weisheit, meinem Königreiche ſtets das Beſte zu rathen. Euch, tapferer Adel, empfehle ich dem göttlichen Schutz. Fahret fort, euch als würdige Nachkommen jener heldenmüthigen Gothen zu erweiſen, deren Tapferkeit das alte Rom in den Staub ſtürzte. Euch, Diener der Kirche, ermahne ich zur Verträglichkeit und Eintracht; ſeyd ſelbſt

Appendix, *No. 8.*

Scholarship Examinations.

Muſter der Tugenden, die ihr predigt, und mißbraucht nie eure Herrſchaft über die Herzen meines Volks. Euch, Deputirte des Bürger-und Bauernſtandes, wünſche ich den Segen des Himmels, eurem Fleiße eine erfreuende Ernte, Fülle Euren Scheunen, Ueberfluß an allen Gütern des Lebens. Ich ſage euch allen mein zärtliches Lebewohl.—Schiller.

1. Give the third person singular, present tense, indicative mood, of the following verbs:—treten, ſprechen, ſterben, halten, fangen.

2. Give the first person singular, imperfect tense, indicative mood, of the above-mentioned verbs.

3. Give the genitive case singular of the following nouns:—das Herz, der Fürſt, der Herr, die Blume, der Menſch, der Wein, der Vogel.

4. How many variations has the Adjective when preceded by the *Definite article?*

5. How many variations has the Adjective when preceded by the *Indefinite article* or a *Possessive pronoun?*

6. Decline through the Singular and the Plural:—Saurer Wein—Weißes Brot—Herber Schmerz.

7. Translate into German:—*I would have taken measure. I would have measure taken.*

8. Translate:—*Are your children daily instructed in religion? Are your children not yet baptized?*

9. State how the English prepositions, *in*, *at*, *to*, *into*, before nouns expressing *place*, are rendered in German.

Translate into French or German:—

Awkwardness can proceed but from two causes; either from not having kept good company, or from not having attended to it. As for your keeping good company, I will take care of that, do you take care to observe their ways and manners, and to form your own upon them. When an awkward fellow first comes into a room, it is highly probable that his sword gets between his legs and makes him stumble: when he has recovered this accident, he goes and places himself in the very place of the whole room where he should not; there he soon lets his hat fall down, and in taking it up again, throws down his cane; in recovering his cane, his hat falls a second time, so that it is a quarter of an hour before he is in order again. If he drinks tea or coffee, he certainly scalds his mouth, and spills the fluid on his breeches. At dinner his awkwardness distinguishes itself particularly: there he holds his knife, fork, and spoon, differently from other people; eats with his knife to the great danger of his mouth. If he is to carve, he can never hit the joint, but in his vain efforts to cut through the bone, scatters the sauce in everybody's face.—CHESTERFIELD.

THIRD YEAR STUDENTS.

GREEK.—*Examiner, Professor MacDouall.*

[*The Greek Papers not reprinted.*]

LATIN.—*Examiner, Rev. Dr. Reichel.*

[*The Latin Examination was chiefly oral.*]

MODERN LANGUAGES.—*Examiner, Dr. Frings.*

FRENCH.

Ma promenade, en sortant du Vélabre (une des faubourgs de Rome), me conduisit sur la voie Appia. J'y ai rencontré le tombeau de Cécilia Métella, de la fille de ce Crassus, qui balança, par son or, le nom de Pompée et la fortune de César.

Ce monument célèbre, consacré par un père tendre à la mémoire de sa fille,

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est une tour ronde ; sa circonférence est détruite ; elle servit long-temps de forteresse dans les guerres civiles d'Italie ; elle est encore environnée de casernes qui sont en ruines. Je suis entré dans le tombeau de Cécilia Métella, et je m'y suis assis sur l'herbe.

Ces fleurs qui, dans le coin d'un tombeau, dans l'ombre, pour ainsi dire, de la mort, faisaient briller leurs couleurs ; cet essaim d'abeilles refugiées entre deux rangs de briques ; le miel qu'elles composaient là ; ce doux bourdonnement de leur vol léger, qui s'échappait du silence, et venait distraire ma pensée, cet azur des cieux, formant au-dessus de ma tête une voute magnifique, que des nuages d'argent et de pourpre peignaient tour à tour en fuyant ; le nom de cette malheureuse Cécilia ; le souvenir de Crassus ; l'image d'un père désolé qui tâche, en amoncelant des pierres, d'éterniser sa douleur : tout cela et mille autres impressions que je ne saurais ni démêler ni nommer, jetèrent peu à peu mon âme dans une rêverie délicieuse ; j'eus de la peine à sortir de ce tombeau.—DUPATY.

GERMAN, FRENCH, ITALIAN.

Some time ago I went to the country to visit an old friend, who had often invited me to come and see him. I was received with the utmost kindness and attention both by him and the mistress of the house. Two beautiful children soon attracted my attention, by their artless expression and handsome features. They were, in some respects, the flower of the family. The vacations had just begun, and they were enjoying with rapture their momentary liberty. The eldest, who might be about fourteen or fifteen, frequently accused his masters of injustice. After stating several complaints, he told us that for the future he was determined not to submit with the same patience he had hitherto done ; and, recalling to his youthful mind the many declamations which he had translated from Greek and Roman authors, he talked constantly of tyranny and oppression. I was for some time amused by his extravagant exaggerations about such trifling matters ; but finding at last that our two scholars entertained intentions bordering upon hostile, which they intended to put in execution the moment they returned to school, I tried to bring them back to more rational thoughts and more moderate sentiments.

FRENCH.

1. When did *Mlle. Scudéry* live, and what is the title of her principal work?

2. How far is the history of French literature indebted to the personal influence of Louis XIV. ?

3. What alteration and improvements did *Voltaire* effect in the style of historical composition ?

4. What does *J. J. Rousseau's* principal glory rest on ?

5. About what year did *Chateaubriand* die ? Which are his principal works, and what is their tendency ?

6. Wherein did *Racine* differ from *Corneille*, as a dramatic writer ?

7. Enumerate some of the principal romance-writers in France of the present day, and name their chief works.

8. Give an account as to the two leading forms or dialects into which the French language was formerly divided.

9. State the principles of French versification.

10. When did *Rabelais* live, and what influence had he on the literary language in France?

11. Compare the French language, as an instrument of expression, with any other language or languages with which you may be acquainted.

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SCIENCE SCHOLARSHIPS.—FIRST YEAR STUDENTS.

MATHEMATICS.—*Examiner Professor Slesser.*

ALGEBRA.

1. If $a > b$ and $c > d$ prove that $(a-b)(c-d)=ac-bc-ad+bd$, thence deduce the rule of signs in multiplication. Illustrate the form of the product by means of a geometrical diagram.

2. Show that $(a_1+a_2+a_3+a_4+\dots\dots)^2=a_1^2+2a_1(a_2+a_3+\dots\dots)+a_2^2+2a_2(a_3+a_4+\dots\dots)+a_3^2+2a_3(a_4+\&c.)+\&c.$ Extract the square roots of $a^3+4b^3-4a^2b+4ab^2+4\sqrt{a^3b^3}-8\sqrt{ab^5}$; and $2x-2\sqrt{x^2-1}$.

3. State and prove the rule for finding the least common multiple of two algebraical quantities. Find the least common multiple of x^6-y^4, x^4-xy^2, x^3y+y^3.

4. If $x^4+px^3+qx^2+rx+s$ have a factor of the form x^2-a, show that $r^2-qrp+sp^3=0$.

5. If x^2+px+q be always positive, show that $q > \frac{p^2}{4}$, and that the least value of the expression is $q-\frac{p^2}{4}$. If $ax^2+2bxy+cy^2$ have always the same sign whatever be the values of x and y, show that $ac > b^2$.

6. Given the two equations

$$(1) \qquad \frac{x-1\frac{1}{2}}{x-2\frac{1}{3}}+5\frac{x+1\frac{1}{3}}{x-\frac{1}{2}}=6$$

$$(2) \qquad \frac{x-9}{x-14}+5\frac{x+8}{x-3}=6,$$

Show without solving them, that the root of (2) is 6 times the root of (1).

7. Solve the equations

$$(1) \qquad \frac{(x+2)(x+3)}{x+1}+\frac{(x+3)(x+1)}{x+2}+\frac{(x+1)(x+2)}{x+3}=3(x+2)$$

$$(2) \quad \left\{\begin{matrix} x^2+xy-y^2=70 \\ x^2-4xy+3y^2=90 \end{matrix}\right\}$$

$$(2) \quad \frac{3+2x}{1-y}=\frac{3x+8}{5y-7}=\frac{7x}{3y-1}.$$

8. There are two arithmetical series having the same first and last terms, viz., a and l, the common difference in one of the series is b and in the other rb; show that the sums of the series are to each other in the ratio of

$$1+\frac{l-a}{b} \text{ to } 1+\frac{l-a}{rb}.$$

9. What is the logarithm of a number to a given base? Find $\log_3 243$, $\log_2 128$, and $\log_{\cdot 01} 100$. Also, having given $\log_{10} 5=\cdot 698970=a$, and $\log_{10} 2\cdot 7=\cdot 4313638=b$, find $\log_{10} 96$, $\log_{10} 64$, and $\log_5 12$.

10. Sum the following series:

$$5-\frac{10}{3}+\frac{20}{9}-\frac{40}{27}+\dots\dots\dots \text{ to } n \text{ terms},$$

$$1+\frac{3}{2}+\frac{5}{4}+\frac{9}{8}+\dots\dots\dots \text{ to } n \text{ terms},$$

and show that

$$\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\dots\dots \text{ in inf.} =3\left\{\frac{1}{2^2}+\frac{1}{4^2}+\frac{1}{6^2}+\dots\dots \text{ in inf.}\right\}$$

11. A and B start from the same point to walk round a field in opposite directions and meet; A halts for m minutes, and they meet when each has just gone half way round. If A had not stopped they would have met n minutes sooner; show that A's rate of walking is to B's as n to $m-n$.

GEOMETRY AND TRIGONOMETRY.

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1. Show that the diagonals of a parallelogram bisect each other. From a given point between two straight lines given in position, draw a straight line such that the part of it intercepted between the two given lines may be bisected at the given point.

2. Find a point in a given straight line which shall be equally distant from two given points.

Describe a circle which shall touch a given straight line in a given point, and also a given circle.

3. P, Q, are two points on the circumference of a circle, the diameter PE is drawn, and the tangents PT, QT, and EQ produced meets PT produced in R, prove that $TR=TQ$.

4. What is the circular measure of an angle? The angles of a triangle are in the ratio of the numbers 3, 4, 5, find the number of degrees in each, and also the circular measure of each.

5. Define the sine, tangent, and secant of an angle, and construct the angle whose sine is $\frac{2}{\sqrt{5}}$.

Given $\tan x+\sec x=\sqrt{3}$, find x.

6. Prove the truth of the following formulæ:—

$$\tan(A+B=\frac{\tan A+\tan B}{1-\tan A\tan B};\ 2\cot 2A=\cot A-\tan A;\ \cot A=\cot 2A+\operatorname{cosec} 2A,$$

and find the value of $\tan 75°$ and $\cot 22\frac{1}{2}°$.

7. Find θ from the equation $p\cos\theta-q\sin\theta=c$. Show that the greatest value which the expression $p\cos\theta+q\sin\theta$ can have, whatever be the value of θ, is $\sqrt{p^2+q^2}$.

8. Show that

$$2\sin A=\pm\sqrt{1-\sin 2A}\pm\sqrt{1+\sin 2A},\ \text{and}\ 2\cos A=\mp\sqrt{1+\sin 2A}\pm\sqrt{1+\sin 2A},$$

and find what signs must be given to the radicals when A lies between 135° and 180°.

9. Show that in any plane triangle ABC, $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}=$ diameter of the circle circumscribing the triangle.

10. In any triangle ABC, prove that

$$\frac{a}{b-c}=\frac{\cos\frac{A}{2}}{\sin\frac{A-C}{2}}:\ \text{and}\ \frac{a^2}{b^2-c^2}=\frac{\sin A}{\sin(B-C)}.$$

SECOND YEAR STUDENTS.

MATHEMATICS.—*Examiner, Professor Slesser.*

ALGEBRA AND TRIGONOMETRY.

1. State and prove the rule for finding the least common multiple of two quantities. The least common multiple of the two fractions $\frac{a}{b}$, $\frac{c}{d}$, is $\frac{ac}{g}$ where g is the greatest common measure of ad, bc.

2. Solve the following equations:

(α) $\sqrt{x^2-3x+4}+\frac{x+1}{2}=\frac{x^2}{6}$.

(β) $(x+a)(x+b)(x+a+d)(x+b+d)=c^4$.

(γ) $\frac{a_1x+b_1y+a_1}{d_1+c_1z}=\frac{a_2x+b_2y+a_2}{d_2+c_2z}=\frac{a_3x+b_3y+a_3}{d_3+c_3z}=\frac{a_4x+b_4y+a_4}{d_4+c_4z}$

3. Find the coefficient of x^n in $\sqrt{\frac{1+x}{1-x}}$ when expanded according to ascending powers of x.

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Scholarship Examinations.

If C_r denote the number of combinations of m things taken r together, and C'_r the number of combinations of n things taken r together, show that—

$$C_p+C_{p-1}C'_1+C_{p-2}C'_2+C_{p-3}C'_3+\ldots\ldots=\frac{\underline{|m+n}}{\underline{|p}\,\underline{|m+n-p}}$$

4. Sum to n terms the following series:

(α) $1.2.3+2.3.4+3.4.5+\ldots\ldots\ldots$

(β) $\frac{1}{1.2}+\frac{1}{2.3}+\frac{1}{3.4}+\ldots\ldots$

(γ) $1+11+111+1111+\ldots\ldots$

(δ) $1+\frac{x^3}{\underline{|3}}+\frac{x^6}{\underline{|6}}+\frac{x^9}{\underline{|9}}+\ldots\ldots$

5. If $\frac{p_n}{q_n}$ be the nth convergent to the continued fraction $a_1+\frac{1}{a_2+}\frac{1}{a_3+}\ldots\ldots$ show that $p_n=a_np_{n-1}+p_{n-2}$. $q_n=a_nq_{n-1}+q_{n-2}$. Show how to determine a solution in integers of the equation $ax-by=c$.

6. A person borrows £p, and repays it by yearly equal payments: what must each payment be that the debt may be repaid at the end of n years, and the lender may receive interest at the rate of r per £1 per annum.

7. Show that all angles which have the same sine as a given angle α are included in the formula $n\pi+(-1)^n\alpha$. Find all the values of θ which satisfy the equation—

$$\sin p\theta+\cos q\theta=0.$$

8. Prove the formulæ—$\sin(\beta+\gamma)\cos(\alpha-\delta)+\sin(\alpha+\delta)\cos(\beta-\gamma)=\sin(\alpha+\beta)\cos(\gamma-\delta)+\sin(\gamma+\delta)\cos(\alpha-\beta)$; $\sin^{-1}x-\cos^{-1}y=\tan^{-1}\frac{xy+\sqrt{(1-x^2-y^2+x^2y^2)}}{y\sqrt{1-x^2}-x\sqrt{1-y^2}}$

Find x from the equation $\cos^{-1}\sin\tan^{-1}\sin\cos^{-1}\tan\sin^{-1}x=\frac{\pi}{3}$.

9. Assuming Demoivre's theorem for an integral index, find the complete expression for $(\cos\theta+\sqrt{-1}\sin\theta)^{\frac{m}{n}}$.

Find the value of $(A+B\sqrt{-1})^n+(A-B\sqrt{-1})^n$.

10. An observer at B wishing to find his distance from A, measures in the line AB the distance $BC=c$, and in the same line the further distance $CD=d$. At a point P the angles subtended by AB, BC, CD are found to be α, β, γ. From these data the distance AB is required.

11. Sum the series

$$\cos\alpha+x\cos(\alpha+\beta)+x^2\cos(\alpha+2\beta)\ldots\ldots$$

and show that

$$\log\frac{1}{\sqrt{1-2x\cos\alpha+x^2}}=\frac{x\cos\alpha}{1}+\frac{x^2\cos2\alpha}{2}+\frac{x^3\cos3\alpha}{3}+\ldots.$$

CONIC SECTIONS.

N.B.—To be proved Geometrically.

1. Show that the tangents at the extremities of a focal chord in a parabola, meet in the directrix and are at right angles.

2. Define a diameter and conjugate diameters. Show that the parallelogram contained by tangents at the extremities of a pair of conjugate diameters in an ellipse, is of constant area.

3. Given in an ellipse, one focus and two tangents in position, show that the locus of the centre is a straight line.

4. In a hyperbola the locus of the foot of the perpendicular from a focus on the tangent is the circle described on the transverse axis.

CO-ORDINATE GEOMETRY.

1. What is meant by the equation of a curve? Find the equation of the straight line making an angle α with the axis of x, and having the $\perp^r$ from the origin on it equal to p. Trace the loci represented by the equations $x+a=0$, $x^2+xy=0$, $xy=0$.

2. If a,b, be the co-ordinates of a point in a line making an angle α with the axis of x, show that the co-ordinates of a point at a distance r are $a+r\cos\alpha$, $b+r\sin\alpha$. Hence find the distance from (a, b) of the point where this line meets the line $x\cos\beta+y\sin\beta-p=0$.

3. Show that the lines $y-mx=0$; $my+x=0$ are $\perp^r$ to each other. The lines $y-mx=0$, $my+x-a=0$, with the part of the axis of x intercepted between them, form a right-angled triangle: hence prove Euclid I. 47.

4. Find the area enclosed by the three straight lines $y=mx$, $y=nx$, $my+x=a$.

5. Show that the equation of the circle with the centre (a,b) and radius r is $(x-a)^2+(y-b)^2-r^2=0$. When the point (x,y) is not on the circle, then $(x-a)+(y-b)^2-r^2$ represents the square of the tangent from (x,y) to the circle.

DIFFERENTIAL CALCULUS.

1. What is meant by the differential coefficient of a function of one independent variable? From your definition deduce the differential coefficients of x^3, $\sqrt{a+x}$, $\sin mx$, $\tan^{-1}x$.

2. Differentiate the expressions

$$(x+\sqrt{1-x^2})^n,\ \sin\sqrt{a-x},\ \log\sin e_x,\ \left(1+\frac{1}{x}\right)^x.$$

3. Given $\dfrac{1}{1-x}=1+x+x^2+x^3+\ldots\ldots$ find the values of

(1) $x+4x^2+9x^3+16x^4+\ldots\ldots$
(2) $x+8x^2+27x^3+64x^4+\ldots\ldots$

THIRD YEAR STUDENTS.

MATHEMATICS—*Examiner, Professor Slesser.*

THEORY OF EQUATIONS, &c.

1. If a_1, a_2, a_3 ... be the roots of the equation

$$x^n+p_1x^{n-1}+p_2x^{n-2}+\ldots p_{n-1}x+p_n=0,$$

show that $-p_1=a_1+a_2+a_3+\ldots\ldots$; $p_2=a_1a_2+a_1a_3+\ldots\ldots+a_2a_3+\ldots\ldots$; &c, &c.

If the equation $x^4+p_1x^3+p_2x^2+p_3x+p^4=0$ have two roots equal, and of opposite signs, show that $p_1^2p_4+p_3^2=p_1p_2p_3$, and show how to find all the roots.

2. If a_1a_2... be the roots of the equation $f(x)=0$, show how to form the equation whose roots shall be $\phi(a_1)$, $\phi(a_2)$,...ϕ being a known function. $a_1a_2a_3$ are the roots of $x^3+px^2+qx+r=0$, form the equation whose rooots shall be

$$\frac{1}{a_3}\left(\frac{a_1}{a_2}+\frac{a_2}{a_1}\right),\ \frac{1}{a_1}\left(\frac{a_2}{a_3}+\frac{a_3}{a_2}\right),\ \frac{1}{a_2}\left(\frac{a_3}{a_1}+\frac{a_1}{a_3}\right).$$

3. Show how to determine the sum of the mth powers of the roots of the equation $f(x)=0$. Find the sums of all the powers of the roots of $x^n+x+1=0$, up to the nth.

4. If the equation $f(x)=0$ has a pair of roots each equal to a, show that a is also a root of the equation $f'(x)=0$.

If the equation $x^5+qx^3-rx^2-t=0$ has a pair of roots each equal to a, then a is a root of the equation $x^3+\dfrac{2q^2x}{5r}+\dfrac{5t}{3r}-\dfrac{4q}{15}=0$.

5. Explain Horner's method of finding the numerical value of the roots of an equation, and apply it to find to 4 places of decimals that root of the equation $x^3-5x-27=0$ which lies between 3 and 4.

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6. If $f(a)$ and $f(b)$ have the same sign, then an even number, or not one of the roots of $f(x)=0$ lie between a and b; and if they have opposite signs, an odd number of the roots lie between a and b.

7. The poles of the sides of the spherical triangle ABC are taken as the angles of another spherical triangle, show that the sides of the one triangle are the supplements of the angles of the other.

Show that the radius of the small circle circumscribing the one triangle, is the complement of the radius of the circle inscribed in the other.

8. Give Napier's rules for the solution of a right-angled triangle, and find what must be taken as circular parts that they may be applied to a quadrantal triangle.

Prove them for a right-angled triangle, when the side opposite the right angle is middle part.

9. Prove the formula $\cos a=\cos b \cos c+\sin b \sin c \cos A$. OP, ON, OQ, are three lines in the same plane, ON bisects the angle POQ, and Ox is any line not in the plane POQ, show that $\cos POx+\cos QOx=2\cos NOx \cos NOP$.

10. If $\alpha=0$, $\beta=0$, $\gamma=0$ be the equations of the sides of the triangle ABC in the form $x\cos\alpha+y\sin\alpha-p=0$, show that the equation of the circle circumscribing the triangle is $\frac{a}{\alpha}+\frac{b}{\beta}+\frac{c}{\gamma}=0$. And the equation of the circle passing through the middle points of the sides of the triangle is

$$\frac{a}{\alpha+\frac{k}{a}}+\frac{b}{\beta+\frac{k}{b}}+\frac{c}{\gamma+\frac{k}{c}}=0,$$

where $k=$ area of the triangle.

DIFFERENTIAL CALCULUS, &c.

1. Show that $\mathrm{lt}_{x=\infty}\left(1+\frac{1}{x}\right)^x$ lies between 2 and 3.

Find $\mathrm{lt}_{x=\infty}(1+ax^{-m})^{bx^m}$

2. Show that if $y=f(x)$ and $\triangle y=f(x+h)-f(x)$, and $\triangle^2 y=\triangle(\triangle y)$ then $\frac{d^2y}{dx^2}=\mathrm{lt}_{h=0}\frac{\triangle^2 y}{h^2}$.

Find $\mathrm{lt}_{h=0}\frac{\varepsilon^{2h}-2\varepsilon^h+1}{h^2}$.

3. If $u=\phi(x, y)$ where $y=\psi(x)$ find the value of $\frac{d}{dx}\cdot\frac{du}{dy}-\frac{d}{dy}\cdot\frac{du}{dx}$.

If $f(x, y)$ and $\phi(x, y)$ be homogeneous functions of x and y each of n dimensions, prove that $f\left(\frac{d}{dx}, \frac{d}{dy}\right)\phi(x, y)=\phi\left(\frac{d}{dx}, \frac{d}{dy}\right)f(x, y)$.

4. Show that the maximum and minimum values of the expression $a\cos^2\theta+2b\sin\theta\cos\theta+c\sin^2\theta$ are the roots of the equation $(x-a)(x-c)=b^2$.

5. If $f(a)=0$ and $F(a)=0$ show how to determine $\mathrm{lt}_{x=a}\frac{F(x)}{f(x)}$

Find $\mathrm{lt}_{x=a}\frac{(f_1x-f_1a)(f_2x-f_2a)\ldots\ldots\ldots(f_nx-f_na)}{(x-a)^n}$; and

$$\mathrm{lt}_{\alpha=\beta}\frac{\sqrt{x^2-\alpha^2}-\sqrt{x^2-\beta^2}}{\alpha-\beta};\ \mathrm{lt}_{x=\pi}\frac{x\cos^2x(\pi-x)^2}{\sin x\tan x}.$$

6. Show how to determine the nature of the multiple point at the origin of the curve $u_m+u_{m+1}+u_{m+2}+\ldots\ldots\ldots=0$, where u_r denotes a homogenous function of x and y of r dimensions.

Ex. (1.) $(x^2+y^2)^2=a^2(x^2-y^2)$:
(2.) $ax^4+bx^3+cxy^2=0$.

7. Prove that $\mathrm{lt}_{h=0}\{\phi a+\phi\overline{a+h}+\phi\overline{a+2h}+\ldots\ldots\ldots+\phi(a+\overline{n-1}h)+\phi(b)\}h=\int_b^a\phi(x)dx$, where $h=\frac{b-a}{n}$.

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Find $\text{lt}_{n=\infty}\frac{\overset{a}{\sqrt{n}+\sqrt{n+1}+\sqrt{n+2}+\dots\dots+\sqrt{2n}}}{\overset{3}{n^{2}}}$, and $\text{lt}_{n=\infty}\left\{a\left(a+\frac{1}{n}\right)\left(a+\frac{2}{n}\right)\dots\dots(a+b)\right\}^{\frac{1}{n}}$

8. Show that a curve may be traced out by the unwinding of a string from the arc of its evolute.

About the convex arc of a semicycloid, the radius of whose generating circle is *a*, there is wound a string of length 5*a*, having one end fixed at the vertex. If the string be now unwrapped till it becomes the tangent at the vertex, find the length of the curve traced out by the other extremity of the string.

9. Show that $\left(\frac{d}{dx}-a\right)^{p}\varepsilon^{ax}u=\varepsilon^{ax}\frac{d^{p}u}{dx^{p}}$, and $\left(\frac{d}{dx}-a\right)^{-1}u=\varepsilon^{ax}\int dx\,\varepsilon^{-ax}u$.

Prove that $\left(\frac{d}{dx}-a\right)^{-p}\cos mx=\frac{(-1)^{p}}{(m^{2}+a^{2})^{\frac{p}{2}}}\cos(mx+p\theta)$ where $\tan\theta=\frac{m}{a}$.

10. Solve the following differential equations:

(α) $\frac{d^{2}y}{dx^{2}}+n^{2}y=A\cos px+Be^{xq}+Cx^{3}+D.$

(β) $x^{2}\frac{d^{2}y}{dx^{2}}+3x\frac{dy}{dx}-3y=Ax^{n}+Bx.$

(γ) $\frac{dy}{dx}+by+az=A\cos nx$ and $\frac{dz}{dx}+bz-ay=A\sin nx.$

11. Show how to determine the orthogonal trajectory of a system of curves whose equation contains one arbitrary parameter.

Find the orthogonal trajectory of all parabolas having the same focus, and axes coincident in direction.

LOGIC.—*Examiner, Rev. Dr. M'Cosh.*

1. Examine the following, and in doing so, bring out all that is involved in the general notion, "The notion expressed by a common term is merely an inadequate (incomplete) notion of an individual."

2. Show precisely how language becomes an instrument of thought both of the logical notion and of reasoning. Bring out in this connexion the evils arising from the use of ambiguous terms in reasoning.

3. What is the nature of logical definition? Does it proceed according to the comprehension or extension of a notion. What does the genus bring out? and what the *differentia?* Illustrate all this by a definition of reasoning. What are the rules of definition?

4. If E be true, what can we know or infer as to A, I, and O? If I be false, what can we infer as to A, E, and O?

5. The rat is not a reptile, for it does not bring forth its young by eggs. Put this reasoning in syllogistic form, indicate the mood and figure, and give the special rules of that figure. Reduce it, and explain the process by which you reduce it.

6. An author seems to be arguing that a particular poet must have been a good man because he was a man of genius Put this reasoning in correct form, and indicate the mood and figure. By what counter-syllogism could you most effectually meet this argument. As you give the syllogism, indicate the mood and figure.

7. What is the nature of the Sorites? Give an example. What modification must the *Dictum* undergo in order to apply it to the Sorites?

8. Define an *argumentum ad hominem?* Give an example. In what circumstances is such an argument allowable?

9. Define accurately mathematical reasoning. What purpose is served by axioms? What discussions have there been on this subject?

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10. What seem to you to be the leading features of the method of Bacon as distinguished from the methods followed in ancient Greece and in the mediæval ages? How does he distinguish his method from the empirical and the rational methods.

11. What precise place does observation hold in the method of induction? Is it the whole of induction? If not, what else is there in induction? What is the end served by experiment, and what are its advantages?

12. What are the ends aimed at in induction? When are we entitled to conclude that we have discovered a real and a natural class? Show that reptile is a natural class.

13. Explain the nature of deduction. Does it admit of an application to physical science? If so, in what way? Show how induction and deduction may be combined.

14. What is the nature of the Analytic, and what of the Synthetic method? What are their several advantages? What place does analysis hold in the inductive method?

CHEMISTRY.—*Examiner, Dr. Andrews.*

1. Three thermometer tubes are filled respectively with alcohol, bisulphuret of carbon, and mercury; what temperatures may be measured by each, and to what errors are the direct observations liable.

2. If a saturated solution of sulphate of soda at 90° is allowed to cool in a close vessel, the salt, on removing the stopper, will usually crystallize: what phenomena accompany the act of crystallization?

3. Describe the different methods of cooling water artificially till it freezes?

4. Give some account of the theory of vapours, and of the methods of determining their force or tension.

5. How is the Dew Point ascertained; 1st, by a common thermometer; 2ndly, by Daniell's hygrometer; and, 3rdly, by the wet bulb thermometer?

6. Give a general account of the subject of radiant heat.

7. How is the specific heat of a solid body determined? Define, also, accurately the term specific heat.

8. State the composition and give an outline of the properties of ammonia?

9. What is the substitution theory, and how is it illustrated by the substitution ammonias?

10. Give a brief account of cyanogen; state its composition and the composition of its compounds with oxygen and hydrogen.

11. What is the composition of marsh gas and of olefiant gas, and how are they prepared?

12. Give an account of the properties and preparation of any one of the following metals, viz. :—sodium, magnesium, or aluminium.

13. Describe briefly the more important compounds of lime.

14. What are the tests of lime and magnesia?

15. Enumerate the chief ores of iron, and describe the process for extracting cast-iron from the clay iron stone.

16. What are the liquid tests of the arsenious and arsenic acids?

17. Describe one of the methods of determining the vapour-density of an organic body.

18. What are the relations by volume in which gaseous bodies have been observed to combine?

19. Describe the varieties of sugar, stating their formulas and the sources from which each sugar is obtained.

20. Mention and briefly describe the principal acids of the series $C^n H^n O^4$, obtained by oxidation from the alcohols.

21. Show how the ordinary gold-leaf electroscope can be applied to illustrate the three cases of electrical induction.

22. Describe the construction and theory of the voltaic pile, and of the modifications of it known as Daniell's and Grove's batteries.

23. State briefly the principal facts of diamagnetism.

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NATURAL HISTORY.—*Examiner, Dr. Dickie.*

BOTANY.

Scholarship Examinations.

1. State modifications of tissue forming, in Exogenous stems, Medulla, Medullary sheath and Medullary rays.

2. Describe the modes of arrangement of leaves on the stem, and the opinions entertained respecting such. State briefly your own opinion on this subject. Give examples of plants illustrating different arrangements of leaves.

3. Give a general account of the nature and structure of the stamen, refer specially to dehiscence of anther, and development and nature of pollen.

4. State the classes of the Linnæan system, and mention examples belonging to Didynamia, Tetradynamia, Diadelphia, Syngenesia, Diœcia.

5. State the characters of the orders Labiatæ and Boraginaceæ. Mention their affinities and differences. State examples of these orders.

6. Refer the following to their orders in the natural system: Bellis, Leontodon, Lamium, Potentilla, Plantago, Scilla, Anemone.

ENGINEERING SCHOLARSHIPS.—SECOND YEAR STUDENTS.

CIVIL ENGINEERING.—*Examiner, Professor James Thomson.*

1. Give examples of the two principal forms of field books for levelling, as taught in the lectures of last Session. Assume a set of field observations containing at least seven foresights, and work out the reduced levels in each form of book, giving the ordinary checks. Illustrate the mode of proceeding when two or more foresights are taken without shifting the station of the instrument.

2. Give the reading of the horizontal limb of the theodolite before you. Then set vernier A to read 145° 24′.

3. If in 24 hours there be a rain-fall of $1\frac{1}{2}$ inches, how many cubic feet of water will fall in that time on a tract of land containing 825 statute acres?

4. Describe the ordinary surveyor's chain; and show reasons why its peculiar length and subdivision are advantageous.

5. In making a survey, when the area is to be computed from the field book, special attention is required in bringing to a close the measurement of offsets from one chain line, and commencing from the next chain line, so as to obtain a proper connexion between the two sets of offset measurements. Explain the special point requiring to be attended to.

6. Describe any of the ordinary methods of conducting a traverse survey; and explain how to compute the area by reference of the measurements to rectangular co-ordinates.

7. State approximately the mean diameter of the earth; and for a sight taken with the levelling instrument, at a distance of 730 links, calculate the correction requisite for curvature of the earth. State whether or not any farther correction ought to be made for atmospheric refraction, and give reasons for your answer.

8. Describe how to test Gravatt's level as to whether it be in true adjustment, the levelling staff being used as the object on which to take sights. Also describe how to adjust it, if its line of collimation be found not to be level when the bubble-tube is so. If a choice be open as to two ways of making the adjustment, state both methods.

9. In the accompanying diagrams,* let $a\ p\ a'$ and $b\ q\ b'$ be the traces of two planes. It is required to find, for each figure, the projections of the intersection of the planes.

10. Give other varieties of cases of the same problem, namely:—*Given the traces of two planes, it is required to find the projections of their intersection.*

11. Describe the parallax and collimation adjustments of the ordinary Y theodolite.

12. In the accompanying leaf of a field book,* check the measurement of the sides of the principal triangle by the split line, and without the use of logarithms.

13. Compute the area of the enclosure shown surveyed in the same leaf of a field book; and perform the usual check calculations.

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* Furnished at Examination, but not printed.

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Scholarship Examinations.

MEDICAL SCHOLARSHIPS.

MODERN LANGUAGES.—*Examiner, Dr. Frings.*

FRENCH.

As the increase of the body, the development of its organs, and the supply of its waste, depend entirely on the blood, the quantity of this fluid must necessarily be constantly diminishing, and require, therefore, replenishment. This is accomplished by the introduction of those substances into the stomach which are capable of being converted into blood; but whatever variety of food may be employed, that only can renew the blood, and consequently nourish the body, which contains one or other of the three animal constituents termed *fibrin, albumen*, and *casein*. These contain nitrogen, and are found in both animal and vegetable substances. It is true, other elements enter into the composition of the various articles employed for the food of animals; such as starch, gum, sugar, fat, &c. None of these, however, contain nitrogen; they are termed therefore hydrocarbons; and, although not alone competent to the nourishment of the body, they perform the very important office of supplying the materials for the production of the animal heat, and are therefore essential to the preservation of health. Hence it is that in cold climates we find the inhabitants require large quantities of oil, fatty substances, and alcohol, to supply the heat which is constantly being abstracted from the surface of the body.—B. COOPER.

La vie organique restée au vieillard, après la perte presque totale de la vie animale, se termine chez lui d'une manière toute différente de celle que nous offre sa fin dans les morts violentes et subites. Celles-ci ont véritablement deux périodes: la première est marquée par la cessation soudaine de la respiration et de la circulation, double fonction qui finit presque toujours alors en même temps que la vie animale; la seconde, plus lente dans ses phénomènes, nous montre le terme des autres fonctions organiques, amenée d'une manière lente et graduée.

Les sucs digestifs dissolvent encore dans l'estomac les aliments qui s'y trouvent, et sur lesquels ses parois, assez long-temps irritables, peuvent aussi agir. Les expériences des médecins anglais et italiens sur l'absorption, expériences que j'ai toutes répétées, ont prouvé que cette fonction restait souvent en activité après la mort générale, sinon aussi long-temps que quelques-uns l'ont assuré au moins pendant un intervalle très marqué. Qui ne sait que les excrétions de l'urine, des matières fécales, effet de l'irritabilité conservée dans la vessie et dans le rectum, se font plusieurs heures après les morts subites? La nutrition est encore manifeste dans les cheveux et les ongles; elle le serait sans doute dans toutes les autres parties, ainsi que les sécrétions, si nous pouvions observer les mouvements insensibles dont ces deux fonctions resultent.

ANATOMY AND PHYSIOLOGY.—*Examiner, Dr. Redfern.*

SECOND YEAR.

1. Name the whole branches of the Aorta in the order in which they arise, and state their distribution very shortly.

2. What are the relations of the following Muscles:—the Deltoid, Gluteus Maximus, the Flexor Digitorum Sublimis, the Supinator Brevis, and the Tibialis Posticus.

3. What are the actions of the Diaphragm and of the Intercostal Muscles? State as precisely as you can, what effect the action of the Diaphragm and Intercostals exert upon the relative position of the Viscera and the parietes of their cavities.

4. Describe the structure and state the functions of Ivory and Enamel, and state any relations or differences which you observe between them.

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5. State what nerves are found in the cavernous sinus, and trace and describe them from that point to their terminations, giving their relations.

6. What parts of the human body can you recognise by the arrangement of their capillaries, and by what characters can you recognise each of these capillary arrangements. Describe accurately the capillary plexuses of the following parts: —Choroid membrane, Mucous membrane of the Stomach, Air vesicles of the Lungs, Muscular tissue, Cartilage, Tendon.

7. What are the constituents of bile, and what is the difference between hepatic and cystic bile? Where do you imagine that bile is first formed, and give your reasons fully. What other views are entertained regarding its formation?

THIRD YEAR.

1. Describe fully the course and relations of the arch of the aorta, and direct attention specially to any which you think would be useful in the diagnosis of aneurism.

2. Give a short description of the muscles which act on the vocal cords, including their relations, and name the source of supply of nerve to each. State the action of each muscle fully, and the way in which it derives such action from its position.

3. Trace the Peritoneum vertically, commencing at the gastro-hepatic omentum: enumerate its processes which have received special names and the extent and connexions of each. What is the relation of the Peritoneum to the Spleen and its vessels, to the three portions of the Duodenum, the descending Colon, the Bladder, and the Uterus and Vagina?

4. The superficial surface of the Masseter and temporal muscles having been dissected, detail, in proper succession, the various steps necessary in the dissection of the Zygomatic region, enumerating carefully the parts which are to be sought for and preserved in the dissection, and giving a short description of each.

5. State what glands pour secretions into the alimentary canal, and what are the most important or peculiar of the constituents of their secretions, giving as full an account as you are able of these constituents.

6. Describe two adjacent lobules or acini of the human liver, and the structures which lie between them.

PRACTICAL CHEMISTRY.—*Examiner, Dr. Andrews.*

1. If a solid body weigh 31.5 grains in air, and 10.2 grains in water, what is its specific gravity?

2. Describe the method of analyzing a mixture of oxygen, nitrogen, carbonic oxide, and carbonic acid.

3. What is the action of the salts of potash and soda on flame, and how may this action be applied to the discovery of either of these bases in presence of the other?

4. Describe accurately the methods of separating soda from potash.

5. Enumerate the bases of the second group, and describe the method of separating them from one another.

6. How is the hydrated sesquioxide of iron prepared, and what is its composition?

7. What is the composition of bone earth, and how may it be analyzed?

8. Suppose a solution to contain the following bases, viz:—oxide of silver, oxide of lead, oxide of zinc and protoxide of iron, how would you proceed to analyze it?

9. Give an account of the uric acid, and of the more important bodies which have been derived from it by the action of oxidizing agents.

10. What are the sources of hippuric acid and its relations to benzoic acid?

11. State briefly how you would analyze a specimen of diabetic urine.

SENIOR SCHOLARSHIPS.

Scholarship Examinations.

IN MODERN LANGUAGES AND MODERN HISTORY.—*Examiner, Dr. Frings.*

French.—Le Loup et l'Agneau.

La raison du plus fort est tonjours la meilleure:
Nous l'allons montrer tout à l'heure
Uu agneau se désaltérait
Dans le courant d'une onde pure.
Un loup survint à jeun, qui cherchait aventure,
Et qui la faim en ces lieux attirait.
"Qui te rend si hardi de troubler mon breuvage?"
Dit cet animal plein de rage;
Tu seras châtié de ta témérité.
—Sire, répond l'agneau, qne votre majesté
Ne se mette pas en colére;
Mais plutôt qu'elle considère
Que je me vas désaltérant
Dans le courant
Plus de vingt pas au-dessous d'elle,
Et que par conséquent, aucune façon,
Je ne puis troubler sa boisson
—Tu la troubles, reprit cette béte cruelle;
Et je sais que de moi tu médis l'an passé.
—Comment l'aurais-je fait si je n'étais pas né?
Reprit l'agneau; je tête encore ma mère.
—Si ce n'est toi, c'est donc ton frére.
—Je n'en ai point.—C'est donc quelqn'un des tiens;
Car vous ne m'épargnez guére,
Vous, vos bergers et vos chiens.
On me l'a dit: il faut que je me venge."
Là-dessus, au fond des forêts
Le lonp l'emporte et puis le mange,
Sans autre forme de procés.—LA FONTAINE.

1. De quelle langue vient le français?
2. Quelles sont les irrégularités des verbes *faire* et *mourir?*
3. Quand le participe passé précédé du verbe *être* est il invariable?
4. Quelle différence y a-t-il entre:

   "*La femme que j'ai* ENTENDU *louer*"—*et*
   "*La femme qui j'ai* ENTENDUE *louer?*"

5. Que doit-on dire: *C'est en étè que les eaux sont* LE *plus basses ou* LES *plus basses?* Expliquer.

6. Quand le *comparatif* est il suivi de l'adverbe négatif *ne?* Expliquer.

7. Comment se forme le féminin dans les adjectifs?

9. Donnez le present complet de l'indicatif des verbes *ranger*, *absoudre*, et *appeler*.

10. Traduisez: "I have more books than I want. Repeat as many of the words as you do remember."

GERMAN.

Glücklich, wer im engbegrenzten Raume
Seiner Heimath tieſe Wurzeln ſchlägt,
Und, gleich einem wohlgediehnen Baume,
Feſt ſteht, und die Aeſte nur bewegt!

Der die Lebens-Nothdurft nur begehret,
Und, allein auf Gegenwart beſchränkt,
Was er heut erworben, heut verzehret,
Und ſich weder heftig freut noch kränkt;

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Den die Welt zu ſehen nicht gelüſtet,
Der mit Beſſrem Gutes nicht vergleicht,
Und, zur letzten Reiſe ſtets gerüſtet,
Sich geräuſchlos aus dem Leben ſchleicht!

Nur umſonſt verdoppeln wir die Schritte,
Nie erreichen wir das Ziel der Bahn;
Immer ſtehn wir in des Cirkels Mitte,
Und der Umkreis weicht ſo wie wir nahn.—Bürde.

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1. Of what age was *Schiller* when he wrote his first drama, and what is its name?
2. When did *Wolfram von Eschenbach* live? State all that you know of him.
3. What are Schiller's principal works?
4. Name one or two of the most ancient lasting monuments of the old German language.
5. When did the preponderance of the High-German over the Low-German become fully decided?
6. Wherein does the High-German principally differ from the Low-German?
7. How was the Anglo-Saxon converted into English?
8. How is the late cultivation of German literature to be accounted for?

ITALIAN.

Non vedremmo giammai la luce del sole se non si fermasse sopra de' corpi, o almeno sopra delle nuvolle. Fugge da noi col fuggir dal nostro atmosfera, e ci abbaglia nelsuo spuntare. Lo stesso avviene della verità: non potremmo concepirla mai, se non si fissasse su degli eventi sensibili, o almeno sopra delle metafore o de' paragoni, che la riflettono; lo bisogna dunque un corpo che la rimandi. Il nostro spirito non esercita forza alcuna nelle verità semplicemente metafische; è abbagliato da quelle, che procedono dalla Divinità, e non puo conoscer quelle, che non si fissano sulle sue opere. Per questa ragione il linguaggio de' popoli inciviliti non è punto pittoresco; egli è pieno d' idee vaghe e di astrazioni, mentre che quello de' popoli semplici e naturali è moltissimo espressivo, perchè ripieno di similitudini e d' immagini; i primi sono soliti a celare i loro sentimenti, i secondi a dar loro la maggior estensione.—BRUNER: *Preambolo della Capanna Indiana.*

Translate into English:

Venne a vederlo un giorno medicare
E salutol con amorosi sguardi;
Chè le parole fur ghiacciate e molle,
Ma gli occhi pronti assai come amor volle.

Quand' Ulivier sentì che Forisena
Lo salutò così timidamente,
Fu la sua prima incomportabil pena
Fuggita, che altra doglia al suo cor sente.

L'alma ha di dubbio e di speranza piena,
Ma confirmato assai par nella mento
D'esser amato dalla damigella,
Perchè chi ama assai poco favella.—PULCI.

Translate into French, German, or Italian:

In general the taste for fables is spread all over the earth, but far more in free countries than in despotic ones. Savage nations ground their traditions upon fables. There is no country where they have been more common than in Greece, where all the objects of nature, of politics, and of religion were but the results

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of some metamorphoses. There were few illustrious families that had not some animal among the number of their ancestors, and that did not count among their male or female cousins, some hulls, swans, nightingales, doves, crows, or magpies. It may be observed that the English, in their literature, have a particular taste for allegory, although the truth may be spoken among them very freely. The Asiatics were in the same case, at the time of Æsop and Lockman; but at present we find no more fabulists among them, although their country is filled with Sultans.

Modern History.—*Examiner, Professor Craik.*

1. State the succession of Parliaments throughout the reign of James I., giving the dates of the commencement and close of each.

2. Describe the general character of the government of Elizabeth.

3. Relate the story of the offence and punishment of Stubbe.

4. Sketch the proceedings in the reign of James I., on the subject of Impositions, not omitting the case of Bates and the Book of Rates.

5. Give an account of the prosecution of Peacham.

6. Give an account of the proceedings against Floyd.

7. Enumerate the five essential checks or limitations upon the royal authority which Hallam holds to have existed in England at the accession of Henry VII.

8. Give an account of the Petition of Right, and of the legislative proceedings in regard to it.

9. Sketch the history of the prosecution of Hampden for refusing to pay ship-money.

10. Give an account of the two acts passed in the reign of Henry VIII. for regulating the succession to the crown, and of the extent to which that king appears to have availed himself of the powers conferred by them.

11. Sketch the exact position of the question of the succession to the crown at the death of Elizabeth.

12. Sketch the parliamentary course in the reign of Elizabeth of the two Wentworths.

13. Recount the proceedings of the Commons towards the close of the reign of Elizabeth on the subject of monopolies.

14. Give an account of the election case of Goodwin and Fortescue.

15. Give an account of the privilege case of Sir Thomas Shirley.

16. State the succession of the Parliaments of Charles I. to the year 1640, inclusive.

17. Relate the history of the Habeas Corpus case of Daniel, Hampden, and others.

18. Give an account of the various expedients adopted by Charles I. to raise a revenue without the help of Parliament.

In Mathematics—*Examiner, Professor Slesser.*

1. Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a+b+c) \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^3 & c^2 \end{vmatrix}$

2. Prove that impossible roots enter an equation in pairs.

The equation $x^3+qx+r=0$ has one root of the form $1+a\sqrt{-1}$, prove that $r=2q+8$.

3. Assuming that $\sin\theta=\theta\left(1-\frac{\theta^2}{\pi^2}\right)\left(1-\frac{\theta^2}{2^2\pi^2}\right)\left(1-\frac{\theta^2}{3^2\pi^2}\right)$ .... thence show that $\sin\theta=\sin(2r\pi+\theta)$, and sum the series

$$\frac{1}{a^2+x^2}+\frac{1}{a^2+4x^2}+\frac{1}{a^2+9x^2}+\text{...........} \text{ in inf.}$$

4. Show that

$$f(x+h, y+k)=f(x, y)+\left(h\frac{d}{dx}+k\frac{d}{dy}\right)f(x, y)+\frac{1}{1.2}\left(h\frac{d}{dx}+k\frac{d}{dy}\right)^2 f(x, y)+\text{.....}$$

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If chords to the curve $f(x, y)=0$ be drawn parallel to the line $\frac{x}{l}=\frac{y}{m}$, and if any one of the chords meet the curve in the points $R_1\ R_2 \ldots\ldots\ldots R_n$, prove that the locus of a point O on the chord taken so that

$$\frac{1}{OR_1}+\frac{1}{OR_2}+\frac{1}{OR_3}+\ldots\ldots+\frac{1}{OR_n}=0 \text{ is the curve } l\frac{df}{dx}+m\frac{df}{dy}=0.$$

5. If u be a function of two independent variables x, y, show that for a maximum or minimum value of u we have $\frac{du}{dx}=0$, $\frac{du}{dy}=0$, and if $\frac{d^2u}{dx^2}, \frac{d^2u}{dy^2}, \frac{d^2u}{dx\,dy}$ do not all vanish we have $\frac{d^2u}{dx^2}, \frac{d^2u}{dy^2} > \left(\frac{d^2u}{dx\,dy}\right)^2$.

Given $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ find the maximum value of xyz.

6. Show that in any curve $r=f(\theta)$, concave towards the pole, the radius of curvature may be found from either of the formulae

$$\rho=\frac{r\frac{dr}{ds}}{\frac{d}{ds}\left(r^2\frac{d\theta}{ds}\right)}=\frac{-r\frac{d\theta}{ds}}{\frac{d^2r}{ds^2}-r\left(\frac{d\theta}{ds}\right)^2}.$$

Deduce these formulae also from a known dynamical theorem.

7. If p be the perpendicular from a fixed point on the tangent to a curve, and ϕ the angle which that $\perp^r$ makes with a fixed line, show that the radius of curvature$=p+\frac{d^2p}{d\phi^2}$.

Find the length from cusp to cusp of the envelope of the straight lines $x\cos\alpha+y\sin\alpha=a\sin m\alpha$, α being the variable parameter.

8. In finding the area of a closed curve $\phi(x, y)=0$ by evaluating the double integral $\iint dx\,dy$, explain how the limits of x and y in the integration are to be found.

Find by integration the area of the curve $x^2+6xy+25y^2=16$.

9. Find the equation of the cone with its vertex at the point (α, β, γ) and circumscribing the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.

Find the locus of the vertex that it may be a cone of revolution.

10. Explain the meaning of the symbols $\triangle 0^m$, $\triangle^2 0^m$, &c., and prove that

$$x^m=x\triangle 0^m+\frac{x(x-1)}{1.2}\triangle^2 0^m+\frac{x(x-1)(x-2)}{1.2.3}\triangle^3 0^m+\ldots\ldots\ldots$$

11. A point is taken at random within a sphere, what is its probable distance from the centre?

IN METAPHYSICS AND ECONOMIC SCIENCE.—*Examiner, Professor Leslie.*

POLITICAL ECONOMY.

1. On what causes will the price of bread, in the United Kingdom, at the end of the nineteenth century depend?

2. Point out the fallacy in the following argument:— "A denser population cultivating a territory, the productiveness of which had increased in proportion to the number of inhabitants, would probably advance in opulence. As its industry became more efficient, the value of its labour would rise in the general market of the world, *and the consequence would be a general rise in prices.*" (Senior's Treatise on Political Economy.)

3. Define the following terms:—(*a*) *money;* (*b*) *circulating capital;* (*c*) *mint price;* (*d*) *wages;* (*e*) *profit;* (*f*) *rent.*

4. What causes have tended to *raise*, and what to *lower*, the price of provisions in Ireland since 1846?

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5. On what causes does the average rate of profit depend?

6. On what causes does the average rate of wages depend?

7. It has been argued that a low rate of wages does not enable a country to undersell another in which the rate is higher. State the argument, and criticise it.

8. Enumerate the changes in the law which, in your opinion, have most contributed to the increase of prosperity in Ireland since the Union.

9. Explain the *feudal system* and its ultimate effects upon Agriculture.

10. What were the arguments for and against the repeal of the Usury laws?

11. Define Jurisprudence in the sense which appears to yourself most philosophical.

12. State some of the principal doctrines of Bentham relative to *legislation and judicial organization.*

In Natural History.—*Examiner Dr. Dickie.*

ZOOLOGY.

1. Describe peculiarities of skeleton, of organs of locomotion, of circulation, &c., in the class Aves. Illustrate by referring to examples belonging to the different orders.

2. State the modes of locomotion and describe briefly the organs concerned in this function, in Mollusca, Echinodermata, and Acalepha. Refer to examples.

3. Refer the following to their places in the system of classification:—Apis, Talpa, Echidna, Hirundo, Vulpur, Vespa, Tænia, Hirudo, Echinus, Velella, Scorpio.

4. State Owen's classification of the Mammalia, give the characters of each division and the orders comprehended in each, and give one example of each order.

5. States Cuvier's classification of Fishes. State any objections to it. Give one example of each order.

6. State the orders of the class Insecta, their derivations, their characters, and give one example of each.

BOTANY.

1. Give a summary of the views entertained respecting the development of Ovule and of Embryo in phanerogamia.

2. Refer the following to their places in the Linnæan and Natural systems:—Rosa, Leontodon, Stellaria, Cardamine, Viola, Ranunculus, Fucus, Agaricus, Cetraria, Lolium, Carex.

3. State the characters of the Natural Orders, Euphorbiaceæ and Compositæ. Mention examples of each.

4. State the classes of the Linnæan system, their derivations, their characters, and one example of each.

5. State De Candolle's system, with the derivations of the names. Give at least two natural orders belonging to each sub-class.

6. State the different kinds of inflorescence and their relation to each other. Mention examples of each.

Examiner, Dr. Wyville Thomson.

BOTANY.

1. Describe the structure of the *Marsileaceae*, and give a sketch of the distribution of the principal genera included in the order.

2. Describe minutely the mode of reproduction in Ferns.

3. What is the course of the woody fibres in the Palm stem?

4. What are the usual therapeutic properties of the various parts of plants belonging to the natural orders, *Cruciferæ*, *Umbelliferæ*, *Solanaceæ*, *Ternstrœmiaceæ*, and *Myrtaceæ*? and give examples.

5. Name some of the principal natural orders of the Calyciforæ, and give their characters.

6. Describe the structure of the various forms of Ovary met with in phanerogamous plants.

ZOOLOGY.

1. Give a general outline of the structure and mode of reproduction of sponges.
2. Describe the morphology of the *Siphonophora.*
3. What do you conceive to be the relation which the Medusoids of the Hydroid Polyps bear to the fixed forms of the same species?
4. Describe the mode of reproduction of the *Echinodermata*, pointing out the relation which the "pluteus" of Echinus and "bipinnaria" of some starfishes bear to the true embryo, and distinguishing the mode of development of the *Holothuriadæ.*
5. Describe any peculiarities which exist in the skeleton of Struthious birds.
6. Describe the peculiarities in structure of the *Monotremata.*

IN ANATOMY AND PHYSIOLOGY.—*Examiner, Dr. Redfern.*

ANATOMY.

1. Describe the method of exposure and examination of the contents of the cranial cavity and the vertebral canal for pathological purposes, detailing the successive steps of the process, and explaining any reasons which occur to you for adopting a particular method.
2. State the method of dissecting the parts of the sole of the foot, describing those which are met with as far as to the second layer of muscles inclusive, and state shortly the distribution of the branches of the nerves and vessels of the sole.
3. Describe the ciliary and the cochlear muscles, and their action.
4. Trace and name the parts of the ducts of the testis from their commencement in the organ to the termination in the urethra, particularizing their characters as to size, structure, and arrangement, as the various parts are successively met with.
5. Describe the contents of the vertebral canal and the manner in which the spinal cord is protected, including an account of the provisions for the movements of the cord and spinal column, and of the methods by which the cord is kept in its place. The characters and structure of the cord are not to be included.
6. Describe carefully the unusual arrangements of arteries which may lead to serious hæmorrhage after the lateral operation of lithotomy.
7. Describe a coloured human blood globule, a white corpuscle of the blood, a pus globule, a salivary globule, a ganglion globule of the cerebellum, a nerve cell of the retina, and an epithelial cell of the interior of the uterus.

PHYSIOLOGY.

1. What is the function of the kidney? What are the constituents of the urine, distinguishing the important and peculiar ones from the others? If you have any reason to think that different parts of this organ discharge different parts of the function, state distinctly and fully all your arguments for arriving at such a conclusion, and what amount of probability there is that it is correct.
2. What changes take place in the respiratory and circulatory systems of a newly-born child? State the precise order of their occurrence, and the causes of each, so as to give a connected history of the whole process, from the moment of birth to the full establishment of the adult condition.
3. What parts of the human body are erectile, and what is their structure? Do the actions of such parts differ from those which take place in other parts and organs, or resemble them in any particulars? Whatever your opinion, support it by references to as many other parts of the human body as possible.
4. Under what varieties of structure does contractility occur? Has the structure of a part any essential connexion with its contractile power? Does any change occur in a tissue during its contraction, in necessary relation with the manifestation of that property? If so, what change?
5. By what means is the blood propelled through the human body? State quite distinctly your reasons for the conclusion at which you arrive, and your objections to any other views which occur to you. What are the functions of

Appendix, No. 8.

Scholarship Examinations.

the coats of arteries and veins? and state how these vessels affect the circulation. Name any marked differences which occur to you in the structure of particular arteries and veins in the human body.

6. What peculiarities of structure occur in different parts of the retina, and what do these teach us of the functions of these parts? What arrangements in the human eye obviate spherical and chromatic aberration in the action of its lenses. Compare the human eye and a photographic camera in action.

Examiner, Dr. Gordon.

SURGICAL ANATOMY.

1. Mention the structures divided in the operation of tracheotomy, and also those unusual distribution of vessels which render them liable to be wounded.

2. Where are foreign bodies which enter the air-passages most likely to be lodged, and why? State also the lesions caused by them, as well as the diagnosis.

3. Describe the anatomy of the various dislocations of the hip-joint.

4. Mention the structures divided in amputation of the metarsal bone of the great toe.

IN THERAPEUTICS AND PATHOLOGY.—*Examiner Professor Ferguson.*

PRACTICE OF MEDICINE.

1. A patient, aged 23, of tubercular diathesis, has had an attack of Pleuritis, with considerable effusion; this has been absorbed, and convalescence established, but two months after he seems to be dropping into Phthisis. Give *all* the abnormal phenomena you would expect to find in a physical examination of the chest of such a case.

2. Enumerate the various changes that the brain's substance undergoes in an attack of acute inflammation.

3. State the various sources of Hæmoptysis, and the means of detecting the source of each.

4. Describe the abdominal complications that are met with in *fevers*, and the principles of treatment to be observed in each.

5. Pathology and treatment of Diphtheria.

Examiner, Dr. Hodges.

MEDICAL JURISPRUDENCE.

1. Describe the methods of preparing Nicotine, and the processes required for its identification.

2. What are the tests for the detection of Phosphorus in cases of supposed poisoning.

3. State the symptoms produced by a poisonous dose of Prussic Acid.

4. How is the adulteration of Tobacco by Sugar detected.

5. What are the precautions required in the examination of gunshot wounds?